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AMATEUR ENLARGING

BY
JOHN F. O'CALLAGHAN
Staff Photographer

AN EASY PHOTOGRAPHIC SCIENCE
OF COLOR, Q. & A. TYPE

PRICE FIFTY-CENTS

FIRST EDITION
JULY - 1938

CAMERA CRAFT PUBLISHING CO
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Staff Sergeant

FIFTEENTH PHOTOGRAPHIC SECTION

Air Corps. U. S. Army

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GUIDE TO ADVERTISERS

Agfa Ansco Corporation	87
Camera Craft Publishing Company.....	86, 88, 90
Defender Photo Supply Company, Inc.....	92
Gevaert Company of America, Inc., The.....	91
Leitz, Inc., E.,.....	84, 85
Medo Photo Supply Corp.....	89
San Francisco Camera Exchange.....	83
Willoughbys	89

CONTENTS

CHAPTER	PAGE
I Introductory	5
II Enlarging Apparatus	9
III Condensers and Reflectors.....	19
IV Safelight	23
V Selecting the Negative	25
VI Making Test Exposures	27
VII Enlarging Papers	31
VIII Control in Printing	35
IX Some Notes on Developers, etc.....	39
X Sepia Tones	43
XI Extra Large Prints	45
XII Spotting	47
XIII Mounting	49
XIV Defects in Negatives.....	52
XV Defects in Enlargements	55
XVI Miscellaneous Notes	58
XVII Glossary of Terms	61
Excerpts from Camera Craft	63

Illustrations from Camera Craft

CONTENTS—*Continued*

EXCERPTS FROM CAMERA CRAFT

Enlarging Box for my Camera, How I Made an.....	70
<i>By Harry B. Bradford</i>	
Enlarging Outfit for V. P. Negatives.....	80
Facts About Enlarging, Some.....	64
Making a Picture from a Snapshot.....	67
<i>Illustrated by Dr. Clara J. Stillman</i>	
Wrinkle for Making Enlargements.....	65
<i>By L. C. Ferguson</i>	

Illustrations from Camera Craft

PREFACE

Effort has been made to include in this little book, everything that would help the beginner and to leave out anything which might confuse him. It is assumed, that he has made contact prints and has some idea of simple dark-room practice. This is by no means all that there is to enlarging, but having mastered the simple rules herein outlined, the beginner will be able to make a start.

Please feel free to write me, if anything in this book does not seem clear to you. I will be only too pleased to help you if I can.

*John P. O'Callaghan
San Francisco,
California*

July, 1928



SERGEANT JOHN P. O'CALLAGHAN

AMATEUR ENLARGING

By John P. O'Callaghan

CHAPTER I INTRODUCTORY

In this day of the small camera, it becomes increasingly difficult to interest the serious amateur in the bulky instruments formerly used. The small bulk and light weight of the modern hand camera make it easy to carry almost anywhere without inconvenience.

The drawback is the small size of the picture. Quite apart from its size, the small camera is, of course economical to use. But we long for larger prints and for more latitude for control and modification in printing, and this leads to the consideration of the enlargement.

Those who have ever made enlargements know that a negative from which a good contact print can be made will nearly always yield an even better enlargement, and there seems to be no good reason why those who do their own printing should not also make their own enlargements.

The stumbling-block seems to be the prevalent idea that there must be something mysterious and very difficult about the making of an enlargement, but in reality it is quite as simple as the making of a contact print, and vastly more interesting.

In making a contact print, the paper and negative are placed in contact in the printer or printing frame. The light is permitted to pass through the negative onto the paper for a given time. The print is then developed and we accept it "as is."

Making an enlargement is a somewhat similar procedure, except that the negative and the paper are separated while printing and that the resulting print may be good or otherwise, depending upon the skill of the operator.

Unlike contact printing, enlarging permits the operator to control the light, so that he may hold back the thinner portions of the negative in order to build up those parts which require longer printing time, such as holding back the foreground in landscapes, while the sky and clouds print up to secure soft-focus or diffused effects; and for other reasons, which we will discover as we gain experience.

It may happen that the first few attempts will not be glaringly successful, but this will not be because the process is difficult, but rather because the beginner lacks confidence in his own ability, through over-anxiety, or through carelessness. Nothing worth while can be accomplished without thought, and this applies to the making of an enlargement as well as to the making of any other thing.

In the following pages, I will try to tell you in the fewest words and in non-technical language, how you may acquire proficiency in this most fascinating branch of photography.

Professionals as well as amateurs know that we do not always get the composition in our negatives just as we would like, but we are sure, that when we made the negative, we had a certain picture in mind and believe it is in the negative somewhere, if we can but find it. Suppose we make a contact print from this negative, and after examining it carefully, mask out the undesirable features where possible. We usually find that our picture is there, but that the image is too small to show to advantage. In making our enlargement, we know what will help the picture and should be included in the enlargement, and what

will not help and so should be masked out. The image may then be projected to the desired size and the result is usually satisfactory.

However, as we proceed and as our work improves, we become more and more critical. This is as it should be. Good work nearly always leads to better and we begin to have an appreciation of values and to have an understanding of the fundamentals of pictorial composition.

It is said, that Tolstoy consumed nearly twelve years in writing a book to answer the question "What is Art?" so it is not for me to attempt an answer; but I do think that we should have a mark at which to shoot. That is, some concept of Art, and your opinion is as good as mine. It is my personal opinion that an understanding of Art comes to us like Salvation or the Measles; we are each at some time exposed to it; on some of us it "takes," while others seem to be immune.

Taste in pictures may be educated, cultivated. We view the beautiful pictures in the art galleries; at photographic salons and exhibitions; in the photographic annuals and magazines and in the display cases of the better photographers in our own cities.

All of this is helping to train the eye to look for what is good in pictures; our own, as well as those of other workers.

If there be a camera club located conveniently, by all means join it. Most camera clubs have well equipped laboratories and dark-rooms for the use of their members. Among the membership there are always clever workers who will be glad to help you with constructive criticism, advice and example.

I have intended that the foregoing chapter should be more or less inspirational and if I have held your interest thus far, I know that you will experience no difficulty in mastering what is to follow.

AMATEUR ENLARGING



CHAPTER II.

ENLARGING APPARATUS

The simplest of all enlargers is the Fixed Focus type. This consists of a light-tight box or cone. The negative is placed between two pieces of clear glass in a frame or holder at one end and the paper at the opposite end. The lens is fixed at the proper distance between.

This enlarger must be loaded in the dark-room; then carried to the white light, usually daylight. The negative end is turned toward the light source for the required time. The cone is then carried back to the dark-room, where the paper is removed, developed, fixed and washed.

This enlarger is simple of construction, inexpensive and almost fool-proof. Its disadvantages are that it is rather wasteful of paper, the size of the enlargement is limited, and that it affords little or no opportunity for modification or control while printing. Its operation is mechanical, and once the proper exposure time is learned, for a particular negative, there is little else to learn about it.

Small cameras using motion picture film are now coming into popular use. With these a large number of negatives may be made with a single loading. One of the popular models is the Ansco Memo. While it is intended for use in a projector, the negative film may also be used to make enlargements, just as any other negative.

The "Leica" pocket roll film is another of the roll film type, using motion picture film. This little camera while very light and compact, is capable of making negatives of the highest quality. This company also makes a projector which may be used in daylight or artificial light by means of which enlargements of post card size are made. This is the ideal album size. If it is desired, these negatives may be projected for enlargements of larger size and of excellent quality.

But as we all desire to move forward and to improve our work, we look for, in an enlarging camera, an instrument which will allow us greater latitude than the fixed-focus types afford. If our aim is to make pictures, we will require more flexibility in the process of printing, which leads to the consideration of other types of enlargers.

There are two other types of enlargers; the horizontal and the vertical types, the latter type usually called Projection Printers. Horizontal enlargers may be adapted to use either daylight or artificial light.

When enlarging by daylight, the back of the enlarging camera is fitted into an aperture in the dark-room window. The remainder of the window is covered up in such a manner as to exclude all light except that which passes through the negative and the lens. A north window should be selected when practicable, as the light from this direction is less variable than from any other. A reflector, made from a board, covered with white paper or blotting-paper, should be placed outside the opening, at an angle of about 45 degrees. This is for the purpose of reflecting light from the sky onto the negative.

It is not my purpose here to devote much time to lengthy discussion of daylight enlargers, for today nearly all amateurs desire to do their work during the evening by electric light, and those so fortunately situated that they can work during the day will also find that it is most convenient to use artificial light, as it is not subject to the variations due to seasonal or atmospheric changes, as is daylight.

The lighting systems generally used for enlarging are: The Carbon Arc Light; Mercury Vapor Tubes and the Concentrated Filament Electric Bulbs. The Carbon Arc is used by many professionals who do a large volume of enlarging. It gives an intense white light, but it heats rather quickly, and requires a large and

well ventilated lamp-house, and is somewhat subject to "flicker," except in the latest types and models.

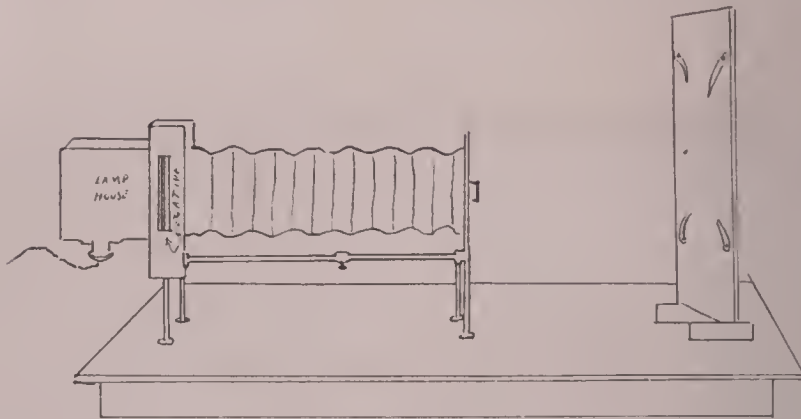
The Mercury Vapor tubes are probably the ideal enlarging light. This light has a very high actinic register for photographic purposes, does not heat readily, is economical of current and is easy on the eyes. For enlargers, the "M" tube enjoys a wide popularity in the profession. However, this system is rather too expensive for the amateur, for whom this little book is being written, and I think the most practicable illuminant for our purposes is the concentrated filament electric bulb of the Mazda type, of from 60 to 250 watts, depending upon the kind of enlarger to be used. These bulbs are easy to install or replace and are economical and reliable.



Elwood Enlarger



This enlarger can be used vertically or horizontally and will make enlargements from negatives 5x7 or smaller. It has a silvered and highly polished parabola-reflector. Your camera may be clamped to lens board of enlarger or your lens may be mounted directly to lens board. This is not an automatic focusing enlarger.



Horizontal Enlarger

A simple and inexpensive little enlarger which sells at about the price of the cheapest of the small vertical enlargers. These should be inspected and compared with other types before deciding upon which to buy.

Kodak Auto-Focus Enlarger

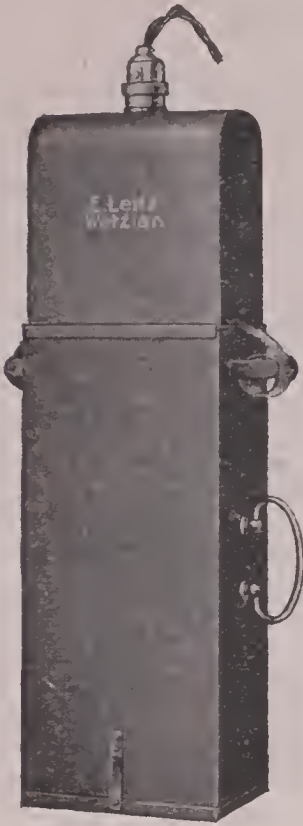


This enlarger will make clear, sharp enlargements from any negatives up to 4x6 inches in size. The prints may be from $1\frac{1}{2}$ to $3\frac{1}{2}$ times the dimensions of the negative used or in other words, from $2\frac{1}{4}$ to $12\frac{1}{4}$ times its area. The largest print that can be made with the enlarger is 14x21 inches, and the largest print that can be made from a negative $1\frac{5}{8} \times 2\frac{1}{2}$ inches is approximately $5\frac{1}{4} \times 8\frac{1}{4}$ inches.

The enlargement can be made from either a film or plate negative. The film can be either a separate negative or

can be enlarged while still in the strip, a slot being placed in either end of the film holder for this purpose.

Leica Enlarging Apparatus



This outfit represents a simple type enlarger to prepare postcard size enlargements from Leica negatives with daylight or artificial light.

It is of the fixed focus type and the hinged back permits the insertion of postcard size enlarging paper in an easy manner.

The negative is placed under an optically plano glass plate in front of the box and two metal clips hold the film flat in place. The special objective 64mm focal length with a relative opening of F-4.5 covers the entire surface of the enlarging paper without showing distortion on the edges.

The time of exposure for an average negative is about 15 seconds by using the special opal glass bulb 100 watt and the latter guarantees a uniform and diffused illumination over the entire negative.

Leica New Variable Enlarging Apparatus for Artificial Light

This enlarging apparatus is a simple device to prepare enlargements from negatives on standard motion picture film up to 11x14" and even larger.

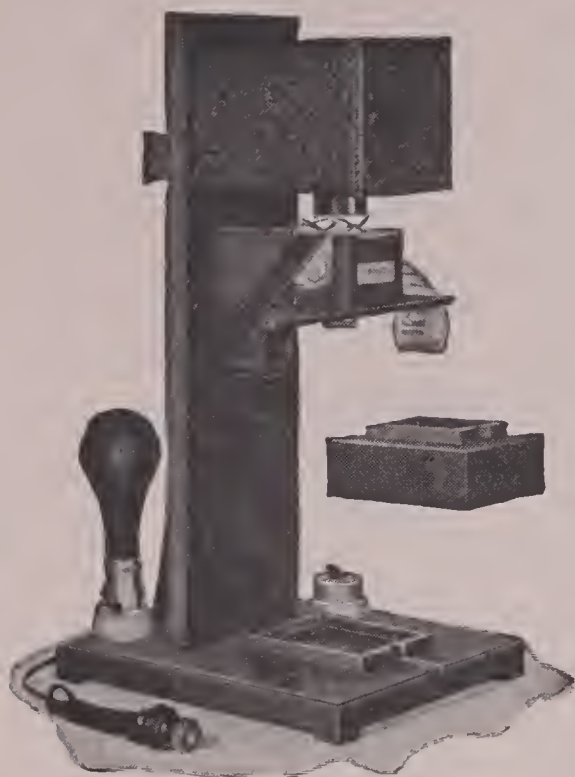
The source of illumination consists of a 60 watt opal glass bulb and with a special condenser in connection with a well corrected objective, having a relative opening of F-3.5, (focal length 50mm); the enlargements obtained are well defined over the entire field.

By raising and lowering the lamp housing which carries the film and objective, the apparatus can

quickly be set to make enlargements of the desired size. The simple way of holding the film permits that either the whole or part of the negative can be enlarged, a fact which will be appreciated by any pictorial photographer. At a slight additional cost this outfit can also be furnished with an iris diaphragm between the lens system which forms additional means to improve the quality of the enlargements to be made.



The Memo Film Enlarging Printer



This machine is designed for making enlarged prints from Memo Camera negatives on Noko Paper. Because of its high speed optical system and illumination, bromide or other enlarging paper is not required. Printing may be done in the same room used for regular contact work, and average negatives will give prints on Noko in from 10 to 20 seconds.

Prints in either of two standard amateur sizes may be made --- $2\frac{1}{4} \times 3\frac{1}{4}$ and $3\frac{1}{4} \times 4\frac{1}{4}$.

It can also be used for 35MM. exposures and for sections of larger negatives not greater than the size of one motion picture frame.

Perfection Automatic Enlarger



This enlarger has ample illumination for chloride paper, automatic focus, spring balance, for ease of operation, border printer, print locator, 20x24 inch hinged easel, fastens to the wall and requires no floor space when not in use. An efficient enlarger for 5x7 negatives and smaller. Accommodates lenses of 6 to 7½ inches focal length.



CHAPTER III.

CONDENSERS AND REFLECTORS

In using artificial light in an enlarger, it is found that the rays of light are scattered in all directions in the lamp-house behind the negative, and only comparatively few of these rays will pass through the negative, unless we adopt some means to direct them, so to speak.

We may collect and direct these rays by means of condensers, reflectors or both. We will briefly consider condensers. These are really large glass lenses, plano-convex in shape, and are usually used in pairs, curved surfaces facing. They are mounted in a frame and slightly separated. Sometimes a third condenser element is employed. The condensers are placed in position in the lamp-house between the light and the negative.

The diameter of the condensers is governed by the size of the largest negative used, and should be at least equal to the diagonal of the largest negative to be used. For instance: if the largest negative is assumed to be 4x5 inches, the condensers should be at least 6½ inches in diameter; seven inches would be better.

For our purpose, we may assume that the function of the condensers is to receive the light rays from the lamp and to project these rays as a cone of light which will cover the entire area of the negative. A piece of ground-glass or of opal glass may be interposed between the condenser elements or between the condensers and the negative, in order to equalize the illumination of the negative.

While there is no doubt as to the efficiency of condensers, it must be admitted that they are rather expensive; a pair of about 6½ inches in diameter with cells, costing in the neighborhood of twenty dollars,

which is rather more than most of us care to invest at first.

Our next thought is the reflector as a substitute. Enlarging with a silvered reflector will give us reasonably short exposures, ample illumination and little heat, provided, of course, that the reflector is of proper shape.

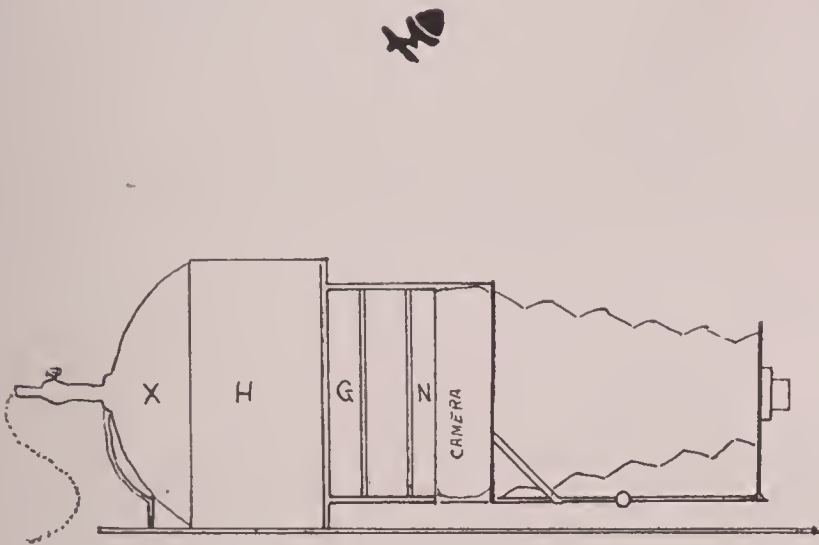
Any concave reflector will reflect light rays from a point source so that they will cross the principal axis, if the light can be placed far enough from the reflector; but the ellipsoid is the only shape that reflects the rays back to another point on the axis of the reflector.

The reflecting principle is employed in all the enlargers of the vertical or projection printer type, which have been especially designed for use by amateurs, and these enlargers embody many of the qualities of the larger professional projectors. There are several different models of projection printers on the market. Some of them are "auto-focus"; that is, when the lens is moved to increase or decrease the size of the enlargement, it is always in focus, regardless of the size of the image. Others of these enlargers must be focused whenever the size of the projected image is changed. In some models, the lens-board may be adapted so that you may use your hand camera, lens and all, clamped to the front of the enlarger, or the lens may be used without the camera. These enlargers may also be used in the horizontal position, if desired, fixing the easel against the opposite wall, which is a desirable feature when we may want to make an extra large print.

The prices of these projectors vary from about \$30 to \$50 and upwards, and I suggest that you inspect some of these models at your dealer's before attempting to construct a home-made enlarger.

Sometimes dealers have on hand used enlargers, which may be purchased at a very considerable saving.

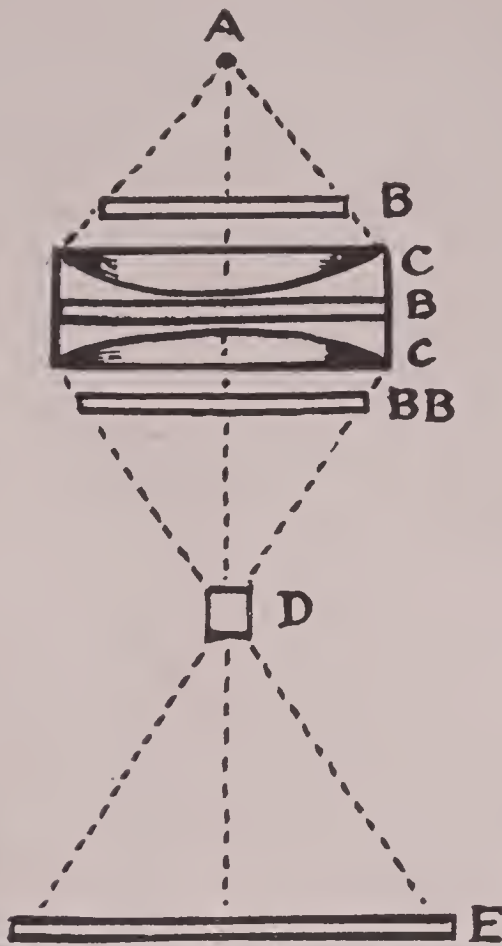
The lens should fully cover the negative to be enlarged and its focal length should be at least equal to the diagonal of the negative. The anastigmat lens is, of course, the best for the purpose on account of its speed, covering power and flatness of field. However, if you are making negatives of one size, the lens with which you made the negative will do very well until such time as you may feel impelled to buy a lens especially for your enlarger.



A Home-made Enlarger Using the Parallax Reflector

These reflectors are so constructed that the maximum efficiency of the light is utilized. This is accomplished by the scientific arrangement of a series of mirrors which collect the rays and focus them on the negative. A ground glass is used between the light and the negative to insure even diffusion of light.

The home-made enlarger comprises a Parallax Reflector, "X"; a grooved box for the negative, "N," and ground glass, "G," with a tin, wooden or cardboard light-shield, "H" and the kodak or hand camera in front, as shown in the diagram.



- A Light source
- B Ground Glass
- BB Negative
- C Condensers
- D Lens
- E Easel

An Enlarging System Showing Condensers in Position

The illuminant, which must be adjustable forward and backward, should be located as nearly as possible to the correct position for giving even illumination on the easel. The front standard of the camera carrying the enlarging lens must be adjustable for focusing the image on the easel.

It will be seen from this diagram that as the lens is moved forward or back the size of the image is changed.

CHAPTER IV.

SAFELIGHT

Bromide paper, used for enlarging, is coated with an emulsion composed principally of bromide of silver in gelatin, very similar to the emulsion on the plate or film on which we make our negatives. It is sensitive to light, not quite so sensitive as the emulsions on plates or films, but more sensitive than the slower contact papers to which we have become accustomed.

Bromide paper has remarkable keeping qualities, both before and after exposure, but it will fog unless protected from unsafe light.

The Wratten Series O Safelight is suitable for use with bromide paper, it gives a bright orange light and is perfectly safe with ordinary precautions.

The Agfa Safelight Series 101 is fully to be depended upon in every way for the same purpose.

Before opening your box or package of bromide paper, turn out the light and wait a few moments in perfect darkness. When your eyes have become accustomed to the darkness, look around the dark-room and make sure that no stray light enters. Look especially around doors and window-casings. Having satisfied yourself that all white light has been excluded, switch on your dark-room safelight.





CHAPTER V.

SELECTING THE NEGATIVE

The negative selected for enlarging should be one that is fairly strong and well balanced. Definition should be critically sharp, and it should be free from stains, scratches, pinholes or other defects. It should have had normal exposure, be fully developed, properly fixed, carefully washed and thoroughly dried. The better the quality of the negative, the better the enlargement will be. (See Chapter XIV, defects in Negatives).

Very thin and contrasty negatives are hard to handle, and seldom can we produce a satisfactory enlargement from them, as usually we get more contrast in the enlargement than in the contact print.

Enlargements should not be attempted with stained or fogged negatives, except under circumstances which cannot be avoided. Pin holes should be spotted out and the negative should be clean and free from particles of dust. As the image is enlarged, so are the imperfections. Spots, hardly visible on the negative, show up remarkably clearly on the enlarged print. Faulty focusing, hardly noticed in the contact print manifests itself in the enlargement, and what we hoped would be a masterpiece, turns out to be a "dud." But even these duds have their uses. From them we learn to make better negatives, to be careful in focusing; to hold the camera level while making the exposure; to secure depth of focus, by stopping down the diaphragm, instead of working at unnecessarily high shutter speed. We also learn to be clean, careful and conscientious in the process of developing, fixing and washing.

Remember this: A few moments' thought before the exposure is made may save a lot of disappointment later. Plan, when possible, to make your negative with the enlargement in mind. This will greatly simplify

your problem. In fact, if the negative is properly made, there will be no problem.

Having chosen your negative for enlarging, decide whether it is to be projected in its entirety or only a portion of it. Cut a mask out of a piece of black paper, so that only the desired portion will be exposed. Now place the negative between two pieces of **clean**, clear glass in the negative holder and insert in the enlarger, care being taken that the negative is upside-down and that the emulsion, or dull side, is toward the lens.



CHAPTER VI.

MAKING TEST EXPOSURES

Now open your package of paper and cut off a strip, two or three inches wide. Place this piece of enlarging paper, face up on the bench, in the position which will be occupied by the developing tray. Cover half the paper with a card or book and leave for a few minutes; then develop. If there is any difference in the appearance in the paper, where it has been covered or uncovered, it indicates that the light is not safe, and no paper should be taken from the wrapper until this condition has been corrected.

Having made sure that the dark-room light is safe, open again your package of paper, select a sheet and cut this into three strips for tests. Place a piece of plain white paper on the easel and focus the image at the desired size. Make sure that the image is as critically sharp as is possible. Switch off the light in the enlarger, remove the plain white paper from the easel and substitute therefor one of the test strips, placing it in such a manner that some part of the highest light and some part of the deepest shadow will reach it. Now cover with a card so that only one-third of the paper will be exposed. The exposure time will depend upon several factors: the intensity of the light; the density of the negative; size of the stop used; speed of the paper and size of the enlargement. But to select a point to start from, we will assume that the correct exposure time is estimated at about ten seconds. Cover two-thirds of the paper and allow one-third to be exposed to the action of the light for five seconds. Then move the card so as to expose the second portion for five seconds. Then remove the card altogether and expose for five seconds. We now have a piece of paper, parts of which have been exposed for five, ten and fifteen seconds.

Develop the test strip in the developer recommended by the manufacturer of the paper for the time advised for normal development. From the appearance of the image and the color, you will be able to determine which of the three exposures is nearest correct, and if necessary, make a further test, increasing or decreasing the exposure time as indicated by the previous test until the correct exposure is ascertained. Growing an exposure nearly always results in having development of a print which has been under-timed or of smudging the print out of the developer before it has been fully developed because it has been over-exposed. This is a deplorable condition, because time and materials have been wasted and nothing has been accomplished. Having found the correct exposure time by test, place a full sheet of enlarging paper on the easel; expose for the proper time; switch off the light in the enlarger, and remove the paper from the easel. An orange colored filter in a cell may be slipped over the lens while the paper is being placed in position. The light passing through this orange glass filter is not sufficient to affect the bromide paper in the short time consumed in placing the paper on the easel. It must, of course, be removed before making the exposure.

DEVELOPING:

Hold the print in the right hand, face up. Now, with a single motion, slide the paper under the developer. Pass the left hand over the surface of the print to make sure that it is completely submerged and to break up any air bells which may have formed. Rock the tray a few times during development, and watch the image build up. Allow the paper to remain in the developer for the full time recommended by the manufacturer, say 1½ minutes, then remove, drain by holding by one corner for a few seconds, and place for a moment in the acid short-stop; then into the hypo, where

the print should be kept in motion for a few moments to insure even action of the hypo on the print. Large prints are liable to give trouble, and it is advised that rather small enlargements be made until some manual dexterity has been acquired. We have purposely gone through the chapter on printing and developing rather quickly, so as to show you the simplicity of the process. But there are certain refinements to be considered before we can expect to turn out really good pictures.

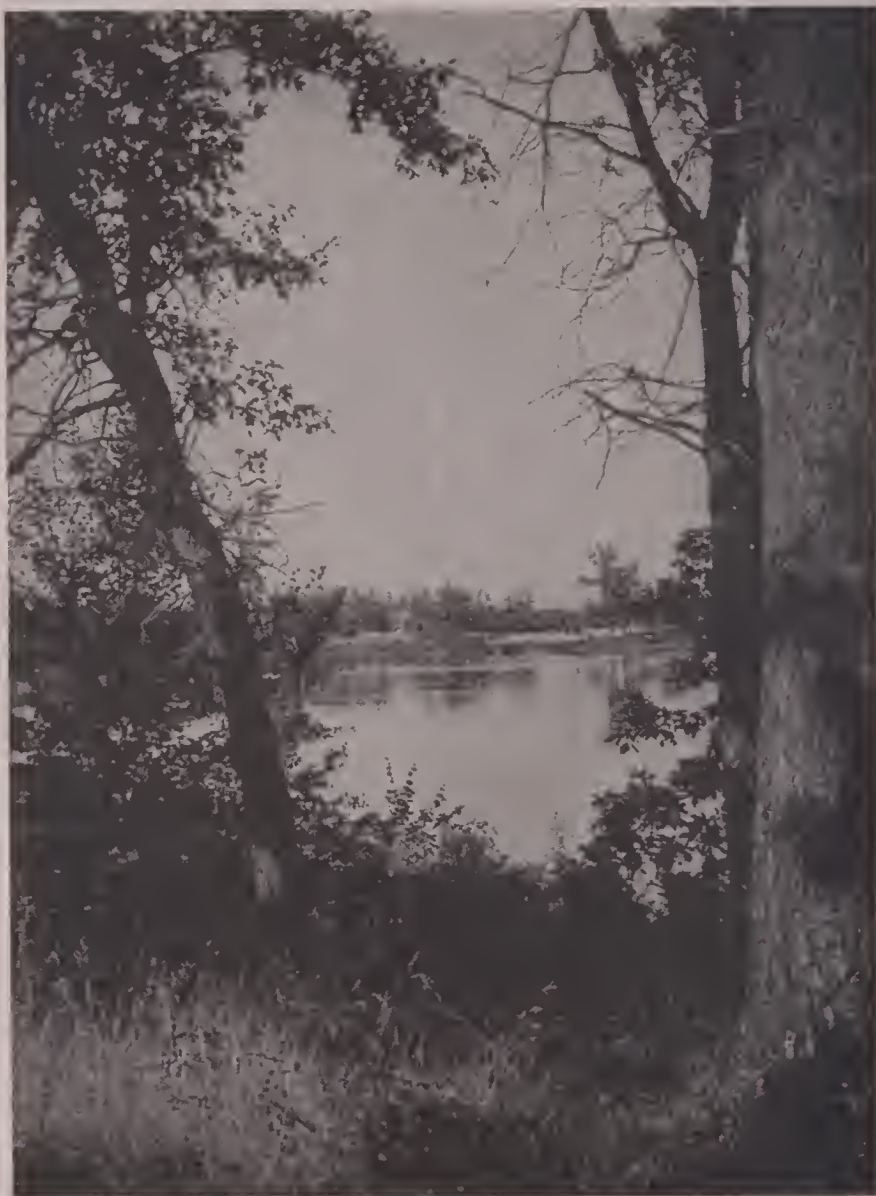
ENLARGING TABLES

All Figures in Inches

Focal length of lens used	Same Size	2 Times	3 Times	4 Times	5 Times	6 Times	7 Times	8 Times
3"	6" 6"	9" 4½"	12" 4"	15" 3¾"	18" 3⅔"	21" 3½"	24" 3⅔"	27" 3⅔"
4"	8" 8"	12" 6"	16" 5⅓"	20" 5"	24" 4⅔"	28" 4⅔"	32" 4⅔"	36" 4½"
5"	10" 10"	15" 7½"	20" 6⅔"	25" 6¼"	30" 6"	35" 5⅔"	40" 5⅔"	45" 5⅔"
6"	12" 12"	18" 9"	24" 8"	30" 7½"	36" 7⅓"	42" 7"	48" 6⅔"	54" 6¾"
7"	14" 14"	21" 10½"	28" 9⅓"	35" 8¾"	42" 8⅔"	49" 8⅓"	56" 8"	63" 7⅔"
8"	16" 16"	24" 12"	32" 10⅔"	40" 10"	48" 9⅔"	56" 9⅓"	64" 9⅓"	72" 9"

Upper figures in each division represent the distance from lens to easel.

Lower figures in each division represent distance from lens to negative.



CHAPTER VII.

ENLARGING PAPERS.

For the benefit of those few who do not know, let me say that there are two general classes of photographic papers; the chlorides and the bromides. The so-called chloride papers are usually used for contact printing and the bromides for enlarging. There are other papers in use by the profession, but for our purpose, the above definition will do very well.

Bromide papers are very much faster than the others and for this reason they are recommended to amateurs for enlarging. Later, as you gain experience, you may be able to find use for some of the slower papers for certain reasons.

The great variety of photographic papers upon the market and sold by American and foreign manufacturers makes it confusing and difficult for the novice to select any one without advice from someone having more experience.

All of these papers have their merits, all are reliable. They may be bought in almost any size and in weights ranging from the very thin tissue-like paper to the heavy double-weight and in white as well as buff, and cream tints. The surfaces range from the highly glazed "Glossy" to the very rough, almost canvas-like surface. These come in a number of different degrees of contrast, making it possible for the experienced worker to select a paper having the proper weight, color and degree of contrast suitable to each negative.

Speed in bromide papers varies with the different brands and each is suited to some specific purpose. Much of the beauty of an enlargement is due to the selection of an appropriate paper; one which will fit the negative from which the enlargement is to be made.

GLOSSY PAPERS are especially suitable where pictures are desired that are rich in detail and where con-

trasty effects are desired. MATTE PAPERS have a tendency to soften the contrast, thereby considerably enhancing the plastic or stereoscopic effect of the finished print. SEMI-MATTE or SMOOTH surface papers are used for smaller prints and where richness in detail is desired without extreme gloss or sheen. ROUGH PAPERS are best suited for large portraits and landscapes; also where sketchy and artistic effects are desired.

In considering the paper of a single manufacturer, it will be found generally that the slower speeds are more contrasty. This does not apply to the so-called portrait papers, nearly all of which give soft prints of beautiful gradation.

If it should happen that there is a chemical defect in your first enlargement, do not immediately jump to the conclusion that it must be the fault of the paper. All the well-known manufacturers turn out reliable products, and the chances are a thousand to one that you are at fault. Read the chapter on "Defects in Prints," and you will find that in nearly every case you have forgotten or slighted some detail in the handling, storing, developing or fixing of the paper. Correct the mistake, when located, and go ahead again.

Unless you have had some previous experience with certain brands of paper, I would suggest the following as the most practical course to pursue:

From your negatives, select those which have been normally exposed and developed and which are free from pin holes and scratches. From these, pick out the negatives which are critically sharp, and from these in turn, make a selection of a few which have some interest or pictorial quality that you like. From the selected few negatives, make a print from each on "proof" paper. As you may not have heard of this before, I may say that this is a "printing out paper": that is, the image becomes visible after exposure to light and does not require development to bring it out.

It is called sometimes Solio paper and is printed in daylight. Place the paper in contact with the emulsion or dull side of the negative in the printing-frame. Expose to daylight. Release half of the back of the frame once in a while so as to observe the printing. When the print appears to have reached proper density, remove from the frame and repeat with the other negatives until all have been printed. These prints will not be permanent without toning; but as we need them only for this trial, we will not have to bother further.

Now examine each print carefully, with a view to trimming off anything in the print which you think should not be part of the picture. This leaves only the essentials of your composition, and will help you to decide on how to mask the negative when enlarging from it. In printing with Solio or proof paper, it is possible to dodge or hold back the thinner portions by shading, so that the denser parts can print. This will give you an idea of how your enlargement may be controlled while printing. While the foregoing is not absolutely necessary, you will find that it is a very material aid in making good enlargements from the start. You may later discard it if you outgrow it. Personally, I have not yet outgrown the habit.

From these prints you must decide upon the size of the enlargement for each, and from the character of the subjects, decide upon the surface and color; whether rough, smooth, matte or glossy and whether white, buff or cream.

If we can only allow ourselves one dozen sheets of paper to begin with, let us select the semi-matte, single weight, of any of the standard brands of bromide paper. This surface will be suitable for most subjects. Don't begin with enlargements as large as theatre posters; enlarging paper can be expensive. I think that 5x7 or 8x10 will be large enough. The size

of the print has nothing to do with the beauty of the picture.

When you go to your supply store to buy your paper, ask to be shown sample prints on the various grades and surfaces carried in stock. They will be glad to show you these samples and to help you select a particular kind. Don't keep changing about. Stick to one brand of paper until you have learned to handle it well and to get results; then you may try another brand and so on until you find the brand which you like best. Cultivate the man behind the counter in your supply store. He can, and will help you in a great many ways. He is anxious for you to succeed.



CHAPTER VIII.

CONTROL IN PRINTING.

In making an enlargement, we should bend every effort to turn out the perfect print. Often we will find that we can mask out distracting features, especially if these are near the edges of the negative. It is not always possible to make negatives which are so harmoniously balanced as to require no control, indeed, it might not be desirable. But often the enlargement can be improved by controlling the exposure, allowing more or less time on different parts of the enlargement, so that the shadow detail may be preserved and the high-lights, sky, clouds, etc., given time to build up. This may be effected by means of a "dodging" device, which may be made of a strip of clear glass, about twelve inches long and about an inch wide. A piece of black paper, about the size of a quarter, may be stuck on one end of the glass. With this, held between the lens and the paper, and kept constantly in motion, hold back the light coming through the negative as desired. Dodging should be done closer to the lens than to the paper. If a piece of glass cannot be had conveniently, a stiff, thin wire will do equally well, by bending one end into a clip to hold a small piece of black paper. The size of the piece of paper must be determined by the size of the area on the print its shadow will be required to cover or dodge. When it is desired to hold back the fore-ground, as in the case of landscapes or seascapes, a piece of card, torn irregularly to roughly conform to the shape of the skyline or horizon, may be interposed between the lens and the paper. After the foreground has been exposed for the required time, the card should be held so as to prevent further light reaching it, while the sky portion is allowed to print for a longer period. The card should be kept moving and at some distance from the paper, so that the light reaching the print, over the

edge of the card, will be properly diffused. When masking the negative, try to keep the horizon line either above or below the exact center of the print, also try to keep the principal point of interest away from the dead center.

It is not my purpose to try to write a treatise on the art of Pictorial Composition, but I am anxious to help you to make your first few efforts pleasing and encouraging.

SOFT FOCUS EFFECTS

While many photographs in small sizes may be pleasing, though critically sharp—and while critical definition is desirable in the negative—in the enlargement, certain subjects present a more pleasing appearance if somewhat diffused. When we look at a tree, we do not see each individual leaf; and in looking at a person we do not notice individual hairs; so when we show these things critically sharp on our prints, they help to destroy the general effect of the picture. The amount of diffusion is largely a matter of personal preference, and also it depends upon the character of the subject and the size of the picture. The larger the picture, usually, the greater the degree of diffusion permissible.

Diffused effects may be secured by means of Diffusion Disks, which come in cells and may be slipped over the lens while the exposure is being made. They give a soft effect to the enlargement, which is pleasing to many. Perhaps a better way to get the artistic effect through diffusion is to buy two ordinary embroidery hoops about six or eight inches in diameter (you can get these at the 5 and 10 cent stores) and between these stretch a piece of black, rather coarse mesh gauze. This, held between the lens and paper during the exposure, for the whole or part of the exposure time will produce any degree of diffusion you desire. Silk chiffon may be used instead of the gauze

if preferred. This will make the exposure time a trifle longer, but if you favor pictorial and artistic effects in your enlargements, its use is indicated and your own experiences and judgment will be your guide.

We will sometimes find that a certain small area of the print will require more exposure than the remainder. In this case, take a piece of card-board of proper size, so that the whole print will be covered, and cut in it a hole of appropriate size and shape. Hold this card between the lens and paper, permitting the light to pass through the hole onto the proper point on the print for the required time. As in using diffusers, the card should be kept in motion, up and down, during the whole of the time.





CHAPTER IX.

SOME NOTES ON DEVELOPERS, ETC.

All manufacturers of sensitized materials maintain a staff of competent chemists and experimenters to formulate developers for their particular emulsions, whether plates, film or papers. A great deal of time, labor and money is spent by these manufacturers, to find the best way to handle their products. Therefore, we may accept the formula given by the manufacturer as being the best possible. Of course, we know that many professional photographers, who may be using a great many different brands of paper in their work, standardize a developer which will be suitable for a variety of different brands; but we must remember, that the professional's volume of business makes this necessary, and his wide professional experience enables him to take liberties. We are not urged by this necessity nor have we the wide experience. So we will do well to stick to the formulas which have been devised by experts for our convenience.

Development is the chemical action which is necessary to change silver salts which have been acted upon by light, from the salts to metallic silver. To do this, four agents are necessary, the Active Agent, or reducer, such as, Metol (Elon or Metol), Hydroquinone, etc.; the ACCELERATOR; Sodium Carbonate; the PRESERVATIVE; Sodium Sulphite and the RESTRAINER; Potassium Bromide. A few minutes devoted to the study of the action of these chemicals will be well spent.

The active agents reduce the silver salts which have been acted upon by light to metallic silver. The accelerator is added so as to stimulate the action of the reducer. These together would rapidly oxidize and spoil unless we first add the preservative (Sodium Sulphite). The restrainer (Potassium Bromide) is added to hold back the action of the developer on the silver

salts which have **not** been acted upon by light, and to keep the highlights and whites clear.

As you become more familiar with the development of photographic papers, you will find that the Metol-Hydroquinone or M-Q developer is always reliable. The reason is this: Metol is a very fast working developer and gives soft black tones; but alone, it works much too fast. It is usually used with Hydroquinone, which is a slow-working developer, giving contrast, density and rather reddish tones. The combination makes a nicely balanced developer, of fair speed and good tones.

The use of the **Acid Short Stop** should be used between the process of developing and of fixing, especially when there are a large number of prints to be made. The Acid Short Stop stops the action of the developer immediately and prevents the Hypo from being neutralized by having developer carried over into it with the print. It also prevents stains and insures that the Hypo will act evenly on the entire print while in the Fixing Bath.

The Acid Fixing Bath is composed of water and Hyposulphite of Soda to which is added the Hardener. The latter is a solution of water, Sulphite of Soda, Acetic Acid and Alum. Its purpose is to harden and toughen the gelatine film and prevent any tendency for staining. The importance of the Fixing Bath must not be under-rated. To insure permanency, prints must be left in the Hypo for about thirty minutes, and the temperature of the bath should be kept at about 60 degrees F. The Fixing Bath should be fresh. When it becomes frothy and feels "soapy" rubbed between the fingers, it should be discarded. As in the case of developers, the Hypo must be mixed according to formula. A freshly made acid fixing bath will bleach the prints if they be left in it too long. Advantage may be taken of this fact by longer fixing to reduce a slightly dark print to a more pleasing quality.

For permanent prints, only a certain number can be

fixed in a given quantity, then the bath should be discarded. Furthermore, in plain Hypo the prints have a tendency to blister; this tendency is overcome by the acid bath.

WASHING. Prints should be washed in running water for an hour at least. In washing prints in a sink or bath tub, care should be taken to prevent water falling upon the prints directly from the faucet. A pitcher or a graduate may be placed under the tap, the overflow from this into the sink will do no damage. Prints should be moved about frequently during washing. Do not allow prints to remain in the water over night. Prolonged washing is harmful.

DRYING PRINTS. Prints coming out of the wash should be drained, then blotted off and laid, face down on blotters or cheese-cloth or towels and left until practically dry. The backs should then be slightly dampened and they should be placed between blotters (separately) and under weights until bone dry. Lintless Photo blotters should be used. Ordinary blotting paper will not do, as it often contains hypo and other impurities. If an acid hardener is used, the prints will not stick to the blotters.





CHAPTER X.

SEPIA TONES

Sepia tones in bromide enlargements are often very pleasing, especially certain landscape compositions, and are preferred by many to the black and white prints.

Prints intended for sepia tone by re-development, should be rather fully exposed, fully developed and thoroughly washed.

There are two distinct methods of getting sepia tones. The first is by the Hypo-Alum toning bath, which must be used very warm and takes upward of half an hour to tone; and if used cold may take 24 hours. The second is by the Sulphide re-developing method, by which sepia tones may be got in a few minutes.

Both methods have their good points, but for the purpose of this little book, the Sulphide re-developing method will offer less difficulty.

After prints are thoroughly fixed and washed, they should be bleached in the following bath until the black image is changed to one of yellow.

Ammonium Bromide.....	100 grs.
Potassium Ferricyanide.....	300 grs.
Water.....	20 ozs.

after which, they are rinsed for about one minute in water and re-developed or toned in the sulphide bath, made up as follows:

Sodium Sulphide (not Sulphite).....	4 ozs.
Water	20 ozs.

From this, make up as required, the working bath, consisting of:

3 ounces of the 20-oz. Sulphide solution above referred to and 20 ozs. water. The prints are placed in this sulphide bath, where they should darken to a full brown or sepia in a very short time, after which, they are washed in running water for about half an hour. The prints will be permanent, provided that the solu-

tions are correctly compounded and that the above simple instructions are carefully followed. This sulphide bath should be discarded when used, as it will not keep.

NOTE: Sepia toning should never be done in the same room where there is photographic paper or other sensitized material, as the sulphide fumes will ruin any paper by attacking the emulsion, even though the paper, plates or film are stored in heavy cardboard boxes.

Further modification of the tone or color of the enlargement is made possible by the use of toners. These toners may be purchased from your dealer in tablet form. They dissolve readily and are very economical. They may be had in blue, green, brown, sepia, red, yellow and salmon. These toners are not at all difficult to handle and the use of them will give your pictures a pleasing variety. Blue for seascapes and moonlight effects; green for landscapes; red for firelight; yellow for sunsets, etc.



CHAPTER XI.

EXTRA LARGE PRINTS

Occasionally an extra large enlargement may be required; one which cannot be handled in the developing trays available. In this case, the following method will be found effective.

After the exposure has been made, thoroughly saturate the print in clear water in the family dishpan or bath tub. Then place it, face up, on the table, which should be covered with oil-cloth. Then with a large wad of cotton, saturate with developer, go quickly over the print from top to bottom and from side to side, continuously until development is complete; after which, go over the print quickly with another wad of cotton, saturated with the acid short-stop; then to the Hypo.

The Hypo for fixing may be used in the bath tub, and as it will require at least a gallon, it would be well to wait until there are a number of the larger prints to be made and make them all in the same evening, when this method is used.

Large trays may be improvised by making shallow boxes of thin boards, lined with oil-cloth. The oil-cloth should be glued to the bottom of the tray, and the oil-cloth should be cut to fit into the corners snugly. The corner seams should then be sealed with paraffin wax, which is indifferent to most chemical reagents. The wax should be heated and poured into the seams where the oil-cloth joins in the corners of the tray.

The Hypo tray should be somewhat larger and deeper than the other trays and they should be marked, so that there would be no chance for the hypo tray being used for developer. After use, they should be thoroughly cleaned. It is realized that this is only a makeshift, but we cannot all afford to buy trays of huge size for only occasional use; and this is the next best way.



CHAPTER XII.

SPOTTING

When the prints are thoroughly dry, they should be straightened out. A good way to do this is to lay the print, face down, on the table. Hold an ordinary office ruler in the left hand, with the edge against the back of the print, and with the right hand, draw the print under the ruler, from different directions in turn, until the tendency to curl is overcome.

When the print is flat, it should be examined carefully and all defects spotted out. If you have read carefully, the chapter dealing with selecting the negative, the only spots on the print will be white. This can be touched up with a pencil or with spotting color.

A fine camel-hair brush should be used. The brush should be slightly dampened and a very small amount of the color taken up. In taking up the color, the brush should be turned in the fingers, so that it is drawn to a fine point. The brush should be almost dry when applied to the spot, and each spot should be gone over several times if necessary, until the spot is the exact tone of the surrounding area of the print.

Spotting colors may be had at the supply stores in convenient form, and twenty-five cents worth will last the average amateur a life time. Spotting with a pencil by an expert may be all right, but a novice will be likely to ruin a print with a pencil, as the spots where the lead was left will shine and will show almost as bad as the original spot. If a pencil must be used, the print should afterwards be held over steam from a tea kettle for a moment, to allow the gelatin to soften and so hide the pencil marks. If you must do this, you should first try a few times with a spoiled print, until you have found just how long the prints must be exposed to the steam. Quite recently a charcoal pencil has been invented. This is known as the "Wolff Positive Pencil." Spotting with this pencil will be invisible, and its use will make spotting a simple matter. Ask to see this at your supply store.



CHAPTER XIII.

MOUNTING

Previous to mounting on light cardboard or heavy paper, the print should be well straightened and edges trimmed exactly square. Lay the same on the mount, centering it, as to given even margins at top and sides with more space at bottom. When in the right position make pencil dots on the mount at the two top corners of the print.

Remove print and lay face down on a sheet of waste paper, then brush a narrow border of paste around the four edges. Lift a corner with a knife, pick up with the fingers, turn it over so the top of the print will be from you, keeping the finger tips inside the paste border.

Lay the top corners of print at the dots on the mount, rub the top edge in contact with the finger, drop the print into place, rub into contact with a clean cloth and place under weight large enough to cover the print until dry.

Mounting prints and enlargements is largely a matter of individual preference. It depends upon the size of the print, the character of the subject, color, and whether or not it is to be framed. Mounts may be purchased ready made or they may be made up to suit the individual taste of the worker. Mounting papers and cards of various colors, tones and weights may be seen at the supply stores and your dealer will be glad to show you samples and advise you on what is best for the particular pictures you wish to mount.

A very good way to finish enlargements, and one which is employed by many of the best workers in the country, is the following:

Project your enlargement on a piece of paper somewhat larger than normally required, say, make a 5x7 enlargement on a 10x12 sheet of enlarging paper. The top corners of the projected image should be two

inches from the top and about two and one half inches from the sides of the paper.

For example, take a 4x6 enlargement on 8x10 bromide paper as an illustration, out of fairly heavy cardboard cut a piece 4x6 exactly. Using either light or heavy cardboard cut a sheet 8x10 exactly. On this center the 4x6 card, giving margins of two inches on the sides and one and one half inches at the top. Holding the 4x6 card from shifting, with a sharp pencil draw an outline of the 4x6 on the 8x10 card. With a waste piece of cardboard under the 8x10, cut along the pencil lines with a sharp knife and straight edge of a ruler, thus getting a 4x6 opening in the large card.

Project the negative on the easel, placing a sheet of white paper behind the 4x6 opening, shift the 8x10 mask around until you take in the desired portion of the picture. Hold the mask in the correct position and push two thumb tacks into the easel along the top edge of the mask and two at side, also mark top of mask. Cover the enlarging light and slip in an 8x10 sheet of bromide paper, cornering against the thumb tacks and then slip mask over the bromide paper, top side up in the same manner. Expose the required time as previously shown by trial slips.

After the print is made and dried, it should be flattened and then, with a drawing pen and india ink, draw a fine outline around the print. The lines should be about one half inch from the top and sides and three quarters of an inch from the bottom edge of the print. After the ink has dried, trim the edges of the print so that they will be one and one half inches from the line at the top and sides and about two inches from the line at the bottom.

A fine die-sunk effect may be secured by cutting a piece of thin, stiff card, about the size of the rectangle inclosed within the inked lines mentioned above, and placing this card in the same relative position over the print. Then turn the print and the card face down on

the table, or on a sheet of glass, and with the rounded end of a stirring-rod, tooth-brush handle, or similar tool, run around the edges of the card. If the back of the print is first slightly dampened with wood alcohol and water in equal parts, the emulsion will not crack and a rather neat looking print will result. Care must be taken, of course, to get the card in the proper position and to keep it from slipping during the process. A flat iron or other convenient weight should be placed on the back of the mount to hold it in position while the tool is being run around the card.

Plate sinking should be done only when double weight paper is used and a little practice with old paper or discarded prints will enable you to do it very neatly.



CHAPTER XIV.

DEFECTS IN NEGATIVES

As stated elsewhere in this book, in order to make the best enlargement, we should select our choicest negative. In order that we may be able to recognize defects and correct them, we should be able to analyze our negatives. I am mentioning here, a few of the commonest causes for poor negatives, suggesting the simplest means of avoiding defects in later efforts and of correcting defects already existing, where possible.

FOG. Causes: Over exposure; unsafe dark-room light; developer too warm; too much alkali (carbonate of soda) in developer. In using film-packs, be sure to shield the slit in the adapter from the light while tearing off the paper, after each exposure. Light leaking in through this slit, often causes a diagonal streak of fog across the film.

THIN, WEAK NEGATIVES. Causes: Under exposure; developer too cold or too weak; not enough carbonate in developer; lighting too flat.

FRILLING. Film softens in developer or wash water. Causes; solutions too warm; prolonged washing. Keep all solutions at the normal temperature; use an acid fixing bath and do not leave negatives in wash water longer than necessary to free them from Hypo.

MOTTLED APPEARANCE: Due to prolonged development or too warm solutions or to not rocking the tray during development.

BLISTERS: Fixing bath too strong; too great difference in temperature of solutions; failing to rinse negatives between developer and hypo bath.

STAINS AND SPOTS: Edges of negatives stained yellow usually indicates that the process of fixing was not complete, that they were not thoroughly washed, or that the bath was too weak to dissolve all the silver.

Irregular Transparent Spots: Due to particles of dust on film before exposure. See that the inside of

the camera is wiped out occasionally and that the holders are free from dust before loading.

Round Transparent Spots: Due to air bells or bubbles which attach themselves to the film in the developer and prevent action of the developer on the spots covered by them. If negatives are developed in a tray, pass the hand over the face of the negative as soon as it is submerged in the developer, to break up the air bells. If using a tank, lower the rack into the tank slowly, then raise and lower it two or three times in the solution. This will break up the air bells which may form on the surface of the developer and which might otherwise attach themselves to the film.

Brown or purple spots: Sometimes caused by dry pyro floating in the air and settling on the negative and by chemical impurities in the wash water. These can be avoided by care in handling pyro and by filtering the water.

Cloudy appearance and semi-transparent streaks: Usually the result of not using sufficient developer or failing to flow the developer quickly over the negative or not keeping the tray in motion for the first few seconds after placing negative in the tray. Small, sharply defined opaque spots occur when water from the faucet splatters on to the negative before development or after development when the negative is partially dried. This has the same effect as uneven drying.

Unsharp image on negative is the result of faulty focusing. When focusing is done by scale, care must be taken that scale is set to the proper distance. If you cannot learn to estimate the distance, then you should measure it. Stop guessing. When using reflecting type cameras, and the image appears to be unsharp, it usually means that the eyesight of the operator is poor or that he is careless. In the former case there is hope. Always focus with the lens at the widest aperture; then stop down the diaphragm as needed. Stopping down will increase the depth of focus and take

care of slight inaccuracies in focusing; but only if the focusing is done with the lens wide open.

Before leaving the subject of negatives, I would ask you to study the following little chart on light conditions and stops to use. I think it will help you to make better negatives.

	U. S. 16	U. S. 8	U. S. 4	
	F. 16	F. 11	F. 8	F. 6.3
Bright Sun.....	1/25	1/50	1/100	1/150
Faint Sun.....	1/10	1/25	1/50	1/75
Bright Cloudy.....	1/5	1/10	1/25	1/40
Dull Cloudy.....	1/2	1/5	1/10	1/20
Very Dull.....	1.	1/2	1/5	1/10

The bold face figures represent the stop and the time and 1/25 of a second is selected, because it has been proven that it is the slowest time permissible with a hand held camera. This is intended for exposures made in the open. When exposures are made in the shade, set diaphragm aperture at next largest stop. The same applies when photographing dark objects close to the camera.



CHAPTER XV.

DEFECTS IN ENLARGEMENTS

When you buy a package of enlarging paper, there is enclosed in the envelope with the paper, a list of instructions for the development, fixation, etc. The correct developing formula is given and you are cautioned about the temperature of solutions and generally you are told the proper developing time for a normally developed print. When the print does not turn out well, it is usually because we have slighted some part of the process of printing, developing, rinsing, fixing, washing or drying. If we can trace the cause of the defect, we can remedy it. Here are a few of the most common causes for poor prints:

Mottled prints: Due to over-exposure or insufficient developing.

Greenish tones: Due to over-exposure or too much bromide in developer.

White Spots: Air bells or bubbles. Avoid this annoyance by breaking up air bells by passing flat of the hand or a wad of cotton over the print in the developer as soon as it is submerged.

Blisters: Due to wide difference in temperature of solutions or to water from a faucet splashing directly onto the prints while washing. Sometimes it is the result of too much acetic acid in the fixing bath.

Fog: May be due to unsafe dark-room light; to under-exposure and over-development; not enough bromide or too much carbonate in the developer or too old paper.

Frilling: Generally occurs if the solutions are too warm; sometimes through careless handling in the wash water.

Scum on prints is usually the result of dirty wash water or lack of acid in fixing bath. Prints should be sponged off with clear clean water before drying.

Blurred image on enlargement made from a sharp negative, indicates improper focusing or that the camera or easel was jarred during the exposure.

Spots: Dark spots on prints are sometimes due to the presence of iron in the water. Circular dark spots are due to air bells on the print in the fixing bath. The bubble prevents the action of the hypo and development continues in the areas covered by the air bells. Patches of irregular size and shape are caused by greasy finger prints on the paper preventing proper action of the developer, on those parts.

Patches will occur, too, in cases of over-exposure; then the print has to be snatched out of the developer before it has been properly developed.

Streaky prints are the result of not flowing the developer so as to completely cover the print during the first few seconds and may be caused by not using an acid short-stop between developing and fixing bath.

Small irregular white spots will result from dust particles on the negative. The negative should be dusted off and the lens dusted with a very soft camel's hair brush.

Brown stains will some times appear if prints are not kept moving and separated during fixing and washing, but this condition usually indicates that the fixing bath has not been properly compounded.

A reddish tinge will be noticeable with some enlarging papers, if prints are allowed to remain in the fixing bath too long or if the bath is too warm; while purple stains may be the result of removing the prints from hypo too soon.

Yellow stains are the common experience of the beginner. They are the result of taking the print out of the developer for examination before being fixed. This condition is due to oxidation. Fix the print first, then examine it.

Remember: If the print has been properly exposed, the image will build up slowly, and after the half tones appear development will seem to pause. Watch out for this pausing point, for beyond it you run the risk of over-developing.

Under-exposed prints develop up slowly and lack contrast; there is no detail in the shadows. Under-exposure and forced development will give weak, flat prints, cold tones and often fog.



CHAPTER XVI.

MISCELLANEOUS NOTES

Weights and measures

10 grains equal $\frac{1}{2}$ scruple
20 grains equal 1 scruple
40 grains equal 2 scruple
60 grains equal 1 dram
8 drams equal 1 ounce
16 ounces equal 1 pound

Fluid Measure

1 drop equal 1 minim
60 minims equal 1 dram
8 drams equal 1 fluid ounce
16 ounces equal 1 pint
8 pints equal 1 gallon

Coin Weights

A dime equals about 40 grains
A cent equals about 48 grains
A nickle equals about 80 grains
A quarter equals about 100 grains
A half dollar equals about 200 grains
A silver dollar equals about 400 grains
A dollar and a dime weigh about 1 ounce.

The above coin weights are very handy and are sufficiently accurate for weighing photographic chemicals. A thin piece of aluminum may be cut to balance the weight of a dime (about 40 grains), this can then be cut in halves and one piece marked 1 scruple. The other half may be again cut in two and one piece marked $\frac{1}{2}$ scruple. The other piece is then cut in two and each half marked 5 grains. A copy of this table pinned up near your chemicals may prove useful.

10% Solutions

Dissolve one ounce of the dry chemical in about eight ounces of water, and when dissolved, add water to make 10 ounces altogether.

Saturated Solution

Dissolve the chemical in hot water until it refuses to take up any more and leaves a deposit of undissolved crystals on the bottom of the container.

Acetic Acid

Glacial Acetic Acid comes usually in 1 pound bottles and should be 99%.

For fixing bath formulas, it is called for at 28%.

To reduce the glacial to the 28%, dilute 3 ounces of Glacial with 8 ounces of water.

Acid Short-stop

Water 32 ounces

Acetic Acid, 28%, 11½ ounces.

Acid Hypo Fixing Bath

Water 64 ounces

Sodium Hyposulphite 16 ounces

When the Hypo has been dissolved, mix separately and add the following hardening solution:

Water 5 ounces

Sodium Sulphite (dry) 1 ounce

Acetic Acid, 28% 3 ounces

Powdered Alum 1 ounce

NOTE: The object of the fixing bath is to dissolve from the film, the silver which has not been acted upon by light and the developer. If allowed to remain in the film, this silver will darken and stain the print. It will be seen, therefore, that in making an enlargement, no process is more important than fixing. First of all the instructions for mixing the Hypo bath should

be followed to the letter, the hardening solution being mixed separately and then added to the Hypo solution. Hypo is inexpensive, and there is no excuse for using an exhausted fixing bath and spoiling otherwise good prints. Remember that the Hypo lowers the temperature of the water considerably, so the fixing bath should be made up some time before it is to be used. Where only a few prints are to be made, it would be best to buy Hypo in the prepared form as Acid Fixing Powder in 1-pound packages, or even in half-pound packages, as sold in all the photographic supply stores.



CHAPTER XVII

GLOSSARY OF TERMS

ACTINIC:—Applies to the light rays which most readily affect photographic emulsions by producing chemical change in the silver salts contained in the emulsions.

ALKALI:—Opposite to acid. Carbonate of soda in the developer is usually referred to as the Alkali.

BATH:—In this book Bath means any of the photographic solutions used in photography; such as Fixing Bath; Toning Bath, etc.

CONCENTRATED:—Applied to solutions mixed with the least amount of water practicable.

CONTRASTY:—Said of prints, this means, that there is great difference between the light and the dark tones; harsh or over-contrast means that the highlights are chalky and the shadows are too dark; there is an absence of gradation or balance.

DENSITY:—Descriptive of negatives which appear very black and transmit but little light; take too long to print and are unsatisfactory for enlarging.

DEVELOPER:—The agent which makes visible the latent image in the emulsion. The active agent or reducer, such as: Pyro, Hydroquinone, Metol, etc.

DIFFUSION:—Applies to light rays which have been passed through ground-glass, opal glass, gauze or chiffon or otherwise interfered with so as to blur or soften the sharp outlines of the picture details.

EXPOSURE:—Submitting plate, film or paper to the action of light in order to make a negative or print.

FIXING BATH:—A solution of Hyposulphite of Soda (Hypo) used to dissolve that portion of the silver in the negative or print which has not been acted upon by light or by the developer.

FLAT:—Tone too even. Lacking in contrast.

GRADATION:—The gradual blending of one tint, shade or tone into another in print or negative. Balance.

HIGHLIGHTS:—The points which receive the most light. The lightest parts of the print and the darkest parts of the negative.

HYPO:—See Fixing Bath.

LATITUDE:—As applied to film or paper means the permissible variation from the correct exposure and developing time. We are able to make printable negatives with half or double the correct time, because of the “latitude” of the emulsion and we are able to save a print, even though we have over or under-exposed or developed it (within reason, of course) because of the “latitude” of the emulsion with which the paper is coated.

OXIDATION:—The action by which a developer absorbs oxygen and becomes discolored. Such developer will stain the print.

PRINTING OUT PAPER (P. O. P.):—A paper coated with an emulsion which prints a visible image by daylight without development. The print is not permanent unless it is toned.

SATURATED SOLUTION:—A fluid holding in solution as much of the chemical substance as it can dissolve.

SOFT:—Applied to negatives or prints which show nearly all the half tones; the transition between highlights and shadows not being abrupt, as in the case of “hard” prints or negatives.

TONE:—The prevailing color of a print or negative. “Warm” tones are those which contain yellow, red or olive tints or hues. “Cold” tones tend to be bluish.

WEAK:—Said of prints or negatives which are thin; without sparkle; lacking in contrast.

Excerpts
from
CAMERACRAFT
pertaining to
Enlarging



SOME FACTS ABOUT ENLARGING

In making enlargements, the amateur is brought in contact with a different medium than that with which he was familiar when making gaslight prints. The general chemical composition of the emulsion is similar enough to put them in the same class, but there are inherent differences which should be known.

There are two sorts of enlarging paper, fast Chlorides and Bromides. The former are generally slower and give what is known as contact quality, that is snappier contrasts and more brilliant body tones and lights. The latter are faster, as a rule, and give softer prints. In each class it is possible to obtain two grades, hard and soft, or in other words more contrasty or less contrasty.

Further modifications are possible by diluting the developer. More water tends to softness and gray instead of black shadows.

It should be known, too, that enlarging increases the inherent contrast of the negative and that the weaker the light and the denser the negative the greater the contrast in the enlarged print.

Negatives intended for enlarging should, therefore, be somewhat thinner than for contact printing.

As the image is enlarged so are the defects. A small pinhole will show as a very large black blot and a slight scratch may print as a very annoying black or white line.

To avoid enlarging a speck of dust to the size of a cobblestone, dust the negative with a soft camel-hair brush and the paper on which you are going to enlarge. Nowhere more than in the enlarging room does cleanliness count for more.

Most gaslight paper developers will serve for bromide papers if diluted to half strength.

If your paper fogs, that is turns gray all over, look to your safe-light, and, if that is all right, try a few

more drops of bromide in the developer; that failing to remedy, cut down exposure if the print jumps up too soon after immersion in the developer, or increase exposure if it takes more than two minutes to become visible.

The developer will serve for a certain number of square inches of paper and if overworked will spot, stain, cease to work or otherwise buck and tell you it is worn out. Developer is cheap compared with paper, and it is better to throw away developer that has done its work than to throw away spoiled sheets of paper.

In working for diffused focus effects remember that lack of definition is not diffusion. A good diffused enlargement shows a satisfying outline or drawing underlying the dissolved or diffused lights and shades. Too often unfortunate accidents of poor focusing or bad negatives are made into a boast. Mushing up a picture does not necessarily mean making a work of art.

If you intended the enlargement to be diffused and it is well done you have succeeded. If you meant it to be sharp and clear and it turns out mushy, you have failed, and no amount of fancy titling can reclaim it. You cannot even fool the novice. Do it over, and do it right.

WRINKLE FOR MAKING ENLARGEMENTS*

By L. C. Ferguson

The following method for making enlargements will doubtless be of interest, as it enables the photographer to obtain GOOD enlargements every time, with no waste of paper. No trial exposures or guesswork enter into the scheme.

The apparatus consists of the usual enlarging camera and easel. The easel, however, is covered with oil-cloth. The rest of the apparatus consists of a broad camel-

**From January, 1928, Camera Craft.*

hair brush and a dish of developer, together with the usual enlarging paper. To make the enlargement, put the negative in the camera in the usual way and focus on the easel to the size desired, and mark the position with thumb tacks. Turn off the light and fasten the paper on the easel. Now dip the brush in the developer and swab it on the paper until it is thoroughly soaked. Turn on the light and the enlargement DEVELOPS as it EXPOSES. Turn off the light every few seconds and watch the progress of development by the ruby light. Keep swabbing on developer and exposing until completed. Certain portions of the picture can be held back by the application of acetic acid, sparingly applied.

The advantages of this method are apparent. No guesswork, no wasted paper. Four ounces of developer is sufficient to develop three or four 8x10 enlargements, or its equivalent.

Measuring Distances

It is possible to become quite accurate in measuring distances while making exposures by training the eye with continuous practice to gauge a certain number of feet. Thus, if you will decide on six feet, let us say, and try again and again, in different places and under different conditions of surface and light, you will soon find it a simple matter to measure ten feet by sighting at the six feet to which you are used and adding half as much and a little more. In the course of time you will plump at all sorts of distances up to twenty-five or thirty feet, which is all that is needed in ordinary photography. Beyond that perspective and illusionary shortening of space will deceive you unless you specially train your eye for that, too. Do not pass this idly by but try it.

MAKING A PICTURE FROM A SNAPSHOT*

Illustrated by Dr. Clara J. Stillman



As It Came to Us

Sometime last year it was my good fortune to please many readers with what was done to and with a simple $2\frac{1}{4} \times 3\frac{1}{4}$ snapshot sent for the monthly competition. The subject was interesting and the material lent itself to treatment. Some of

you may recall the man and boy following a plow, with the sunlight shining on them from behind and apparently the sunset in the front. Criticism on this "Solecism" came in plenty. The fact is that the sun was directly at my back when the cloud negative was made and what the critics, justly enough, said was the sun was really an opening in the evening clouds through which the blue photographed too brightly.

Lately a friend of Miss Reed's brought her a little snap which she thought might make a picture. By the same simple methods I have tried to please her, and I hope you. Judge for yourself, and whether or not you approve be assured you can do as well or better with more time, and greater art.

The first step was to trim off the non-essentials and diverting elements. Next to make an upright of the horizontal. Then to work on the terrible wires of the fence and the obvious telegraph pole. The wires were easily etched out with the proper blade, the pole worked on with knife and lead, and then the clouds were double-printed in. A clear enlargement having

**From December, 1927, Camera Craft.*



Non-Essentials Trimmed

been made it was easy to produce a copy negative from which as many duplicate prints as might be desired could be printed.

The trick of double-printing clouds is easy. Just dodge the sky while you enlarge the landscape, then with a yellow screen over the lens place your cloud negative in the enlarger, put the clouds as you want them on the final picture, and take off the screen, now dodging the landscape. The sky exposure must of course be much shorter than the landscape and a slight out of focus or diffused image of clouds is, to my mind, most acceptable.



Clouds Printed In

The print is by Dr. Clara J. Stillman and as the idea and sentiment it conveys are hers, mine was merely the privilege of doing a little mechanical work that has perhaps carried her message more effectively.

Note that the telegraph pole might almost be accepted as a tree trunk in the final print. More could be done in that particular but this will show the possibilities.

HOW I MADE AN ENLARGING BOX FOR MY CAMERA*

By Harry B. Bradford

With Illustrations by the Author

Few boys progress far in photography before they become dissatisfied with the small pictures usually produced by the cameras which they first purchase. A camera which will take a large picture is quite expensive, to say nothing of the plates, paper and other necessities required for the finished pictures. Then, too, we don't care to take all our pictures as large as 6x8 inches—we want enlargements of only our best ones. Taking these things into consideration, I think many boys, who are fond of picture-making, will appreciate a good enlarging outfit, and I am sure that any one who has tried to darken a whole room for this purpose will enjoy the luxury of this enlarging box. Instead of darkening a room, as is usually done, only the small space required to be dark is enclosed in this box.

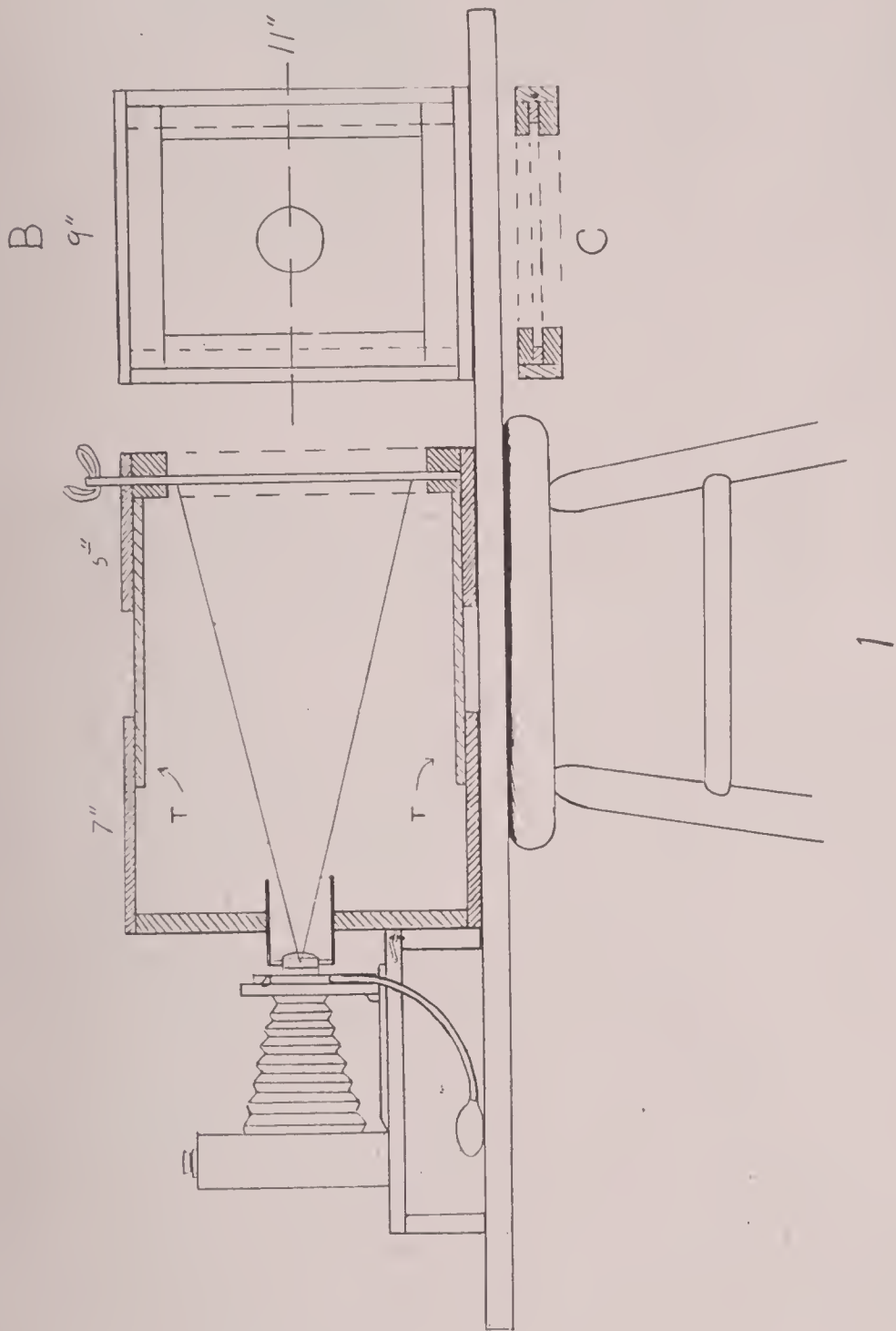
While enlargements may be made with almost any camera, one with a bellows, and an easily removable back, is preferable. I will describe the box I have made to suit my "Pony Premo No. 4" camera, square back, and of 4x5 size. As exact dimensions must vary according to the kind of camera one uses, and the size of enlargements desired, I will only give a few, which describe my particular box and its fittings.

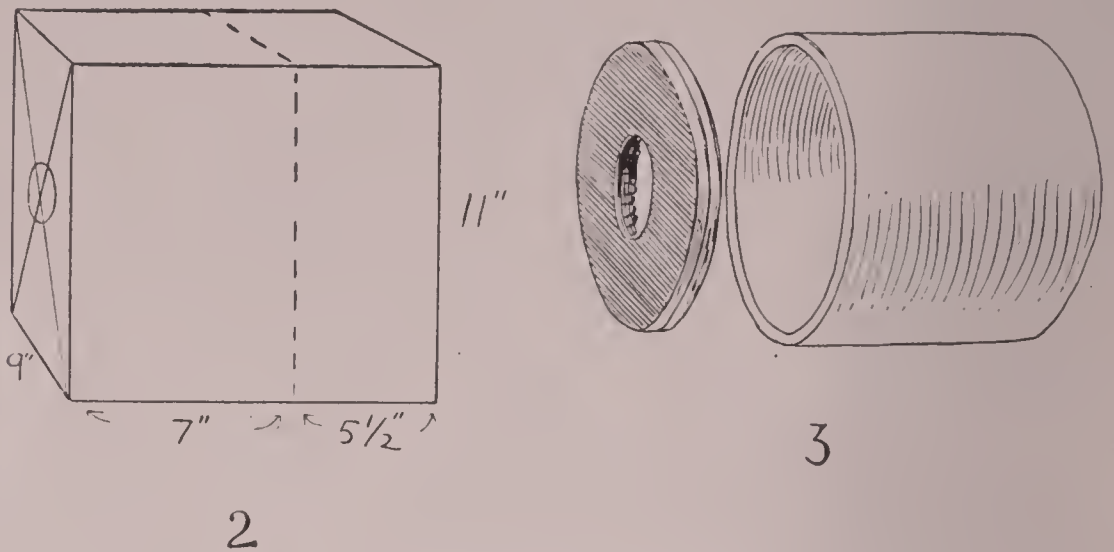
Fig. 1 shows the whole scheme in a nutshell. The camera, on a stand made for it, has its lens tube or "hood" stuck into the mailing tube projecting from the front board of the enlarging box. The back of the camera, which holds the ground glass and plate holder, having been removed, a negative holder, holding a negative, is put in its place.

The outfit is placed upon a smooth board or table, and placed up close to a window upon which the sun

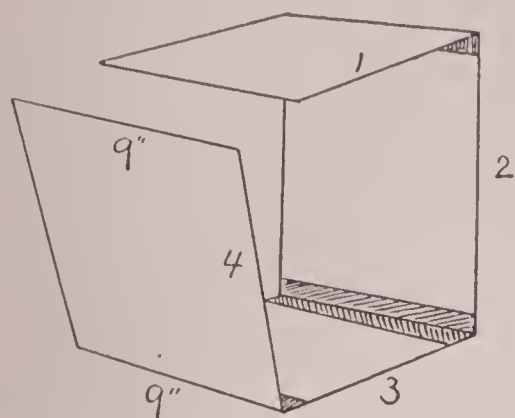
**From July, 1924, Camera Craft.*

AMATEUR ENLARGING





shines directly. A piece of tissue paper (onion skin) about 12x16 inches, is attached to the window pane (with passe partout binding strips) directly back of the camera, which is placed six inches or less from the window glass. This paper is used to diffuse the strong sunlight before it comes through the negative. A sheet of bromide, or other suitable paper, is placed in one of the paper holders (Fig. 8) while in the dark room, just as a plate is loaded into a plate holder. This paper holder is then placed in its grooves in the back of the enlarging box, for exposure to the image reflected through the negative and lens of the camera. After exposure, the slide is pushed down to cover the paper, when the holder is removed and taken to the dark room for development. During focusing on the ground glass (Fig. 7) a large opaque cloth is spread over the whole box and camera, except the back of the camera. Some weight is placed on the front section of the enlarging box, at No. 7 (which shows the length of front section), and the back part (No. 5) is moved to or from the lens, for focusing on the ground glass. This operation is accomplished by aid of the telescoping sliding inner sides, shown at "T" "T." An end view of the box is shown at "B," and a section of this below at



4

“C,” showing grooves for the ground glass frame and paper holders. Fig. 5 gives a perspective view of the outfit with holder and ground glass removed.

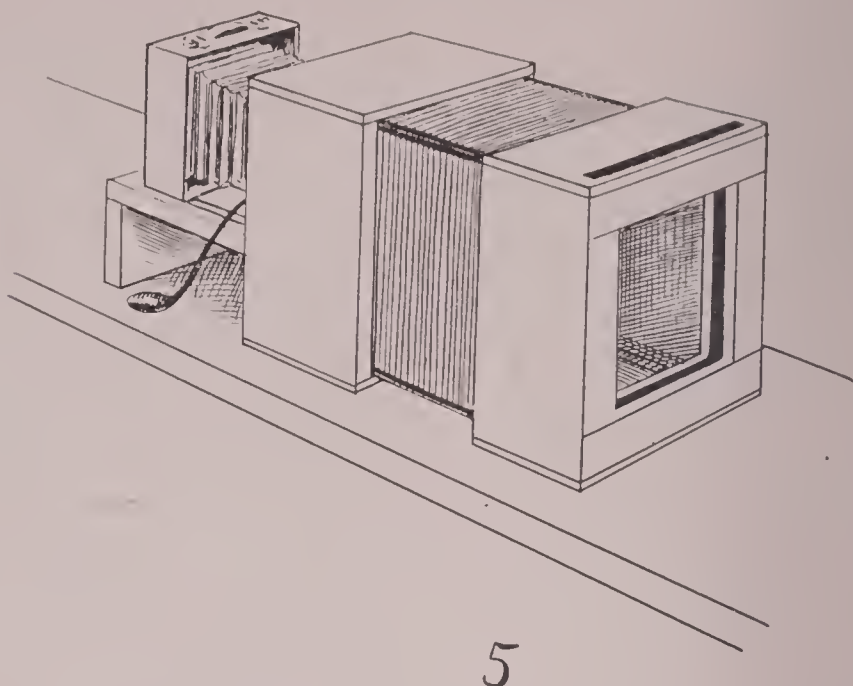
The camera, being on the outside of the box, is easily adjusted as to bellows length and diaphragm during focusing.

Now for details as to its making. Select the best box (from your grocer) you can find, of about the dimen-

sions given in Fig. 2, and if it has no top or cover—make one, whether for its top, side or front, as it must be all boarded up. Now mark around each side of this box, as indicated by dotted line in Fig. 2, and cut it in two as accurately as possible, sandpapering the edges afterwards. Have these two parts in about the proportions indicated, the front being longer.

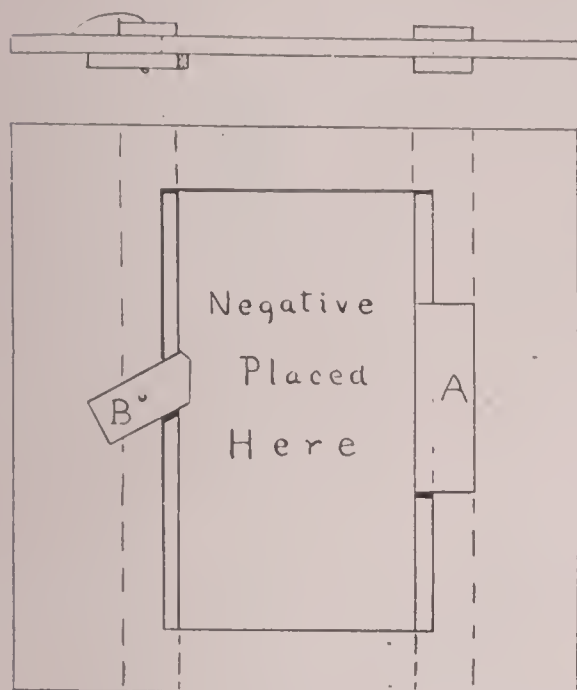
The next article needed is a stout piece of mailing tube, $2\frac{1}{2}$ or $2\frac{3}{4}$ inches in outside diameter. Cut a cylinder from this about $3\frac{1}{2}$ inches long, then cut two circular discs to fit in one end of it. The best material for other needed parts, as well as these discs, is “pulp board.” This comes in large sheets about 24x48 inches, and the No. 20, which should be used, is $\frac{1}{8}$ inch in thickness. This is much easier to work with than wood, and will not warp or shrink. It may be had from any large dealer in paper. After cutting the discs, glue them together, and when dry cut a hole in the middle large enough to admit the lens hood of your camera, making a loose fit.

Several sheets of black carbon paper, such as photograph albums are made from, should be next pro-



vided. Paste a circular piece of this paper over the face of the disc, cutting a small hole in the center and snipping its edges to form teeth, which are to be pushed back through the hole, forming a surface which will hold the camera lens firmly. Paste the edges of disc and fit it into the end of mailing tube, black paper facing outward, as shown in Fig. 3. (Higgins' "Drawing Board" paste is best to use for all pulp board.) When disc is dry, paint all within mailing tube a dead black with India ink. Now cut a circular hole in the front of your box, into which the mail tube will fit snugly (see Fig. 2). Push the tube half way through this hole, then give your attention to the back part of your box. Cut an opening in this $6\frac{1}{2} \times 8\frac{1}{2}$ inches, or build it in as shown in Fig. 1, B. Next, either line the whole interior of the box with your black carbon paper, pasting it in, or stain the interior black.

A sheet of double-faced, corrugated board, which comes one yard square, is best for the sliding telescopic part, although pulp board might do. Before bending this, cut outer edges with a knife, using a strip 9 inches in width and long enough when formed into a square

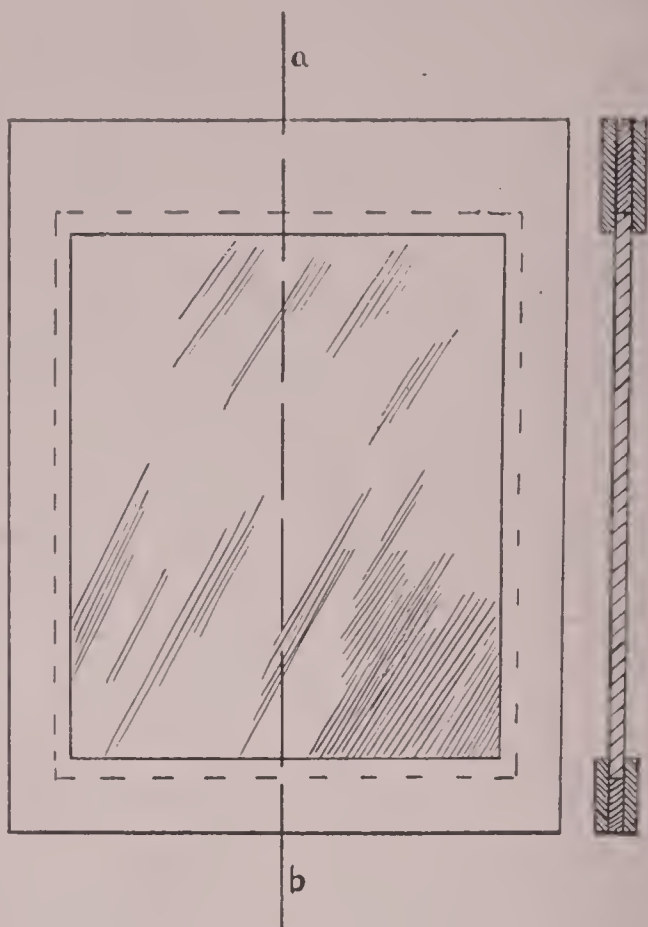


6

to fit into the rear section of your box. Join outer edges, where boards come together, with passe partout, also bind all other outside edges or corners, except those numbered 1, 2, 3 and 4, Fig. 4. Along the inner angles of these boards paste strips of black carbon paper as shown in Fig. 4. When this slide is done, and dry, push it into the rear box part, allowing only six inches to project outside, evenly all around. Fasten

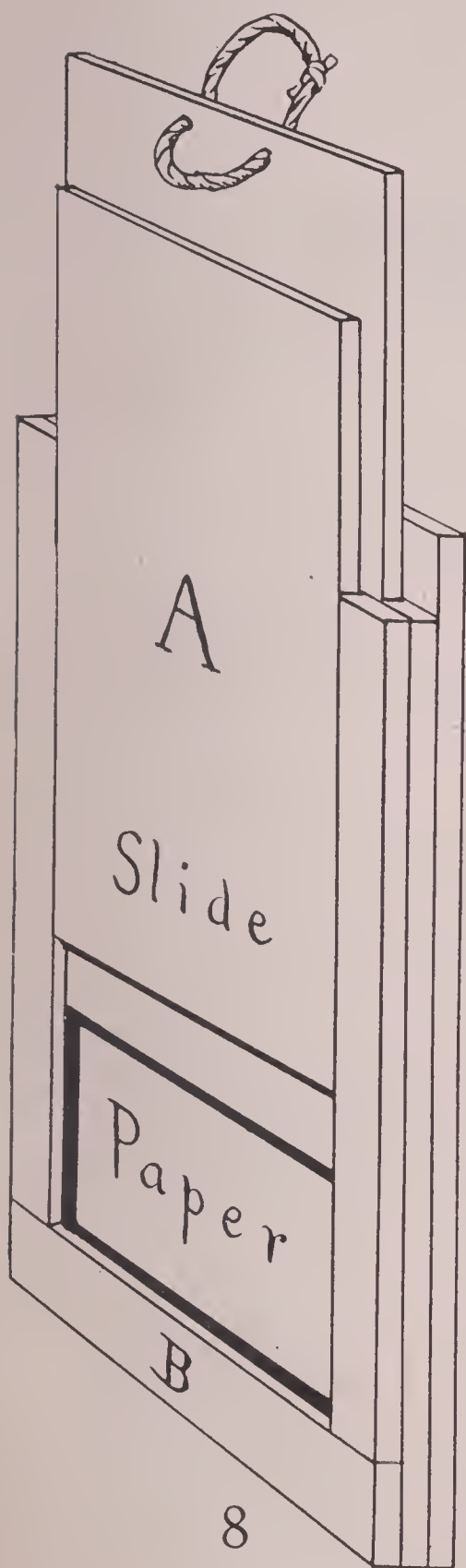
this firmly in place by several tacks, an inch or so from its rear edge, in all four sides. (The edges unbound with passe partout [1, 2, 3, 4] go inside the box.) When this is done, see if it will fit well and slide smoothly into the front section of your box, as shown in Fig. 5.

Cut out a negative holder next, from pulp board, the outer part of which must fit the back of your camera exactly, when its own back is removed. In the center of this cut an opening to fit the size negatives you want to enlarge. This done, paste a pulp board strip along each side of this opening, at the back, having them project inwardly $\frac{1}{8}$ of an inch. On the front side, paste a block ("A," Fig. 6), at the right, and a button "B" at the left, to fasten in the negative. Fig. 6, top view shows how button is fastened on with a bent pin. Paint all front face of this with India ink. The black side must face in the camera.

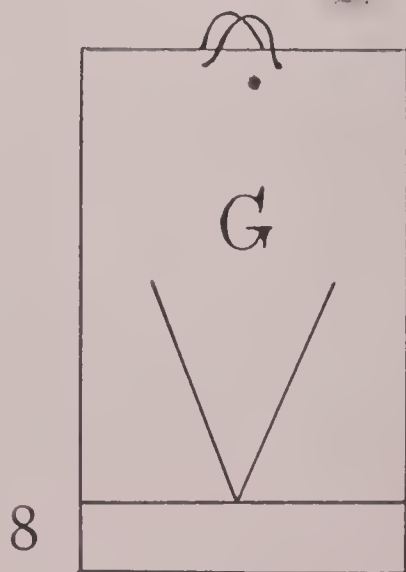
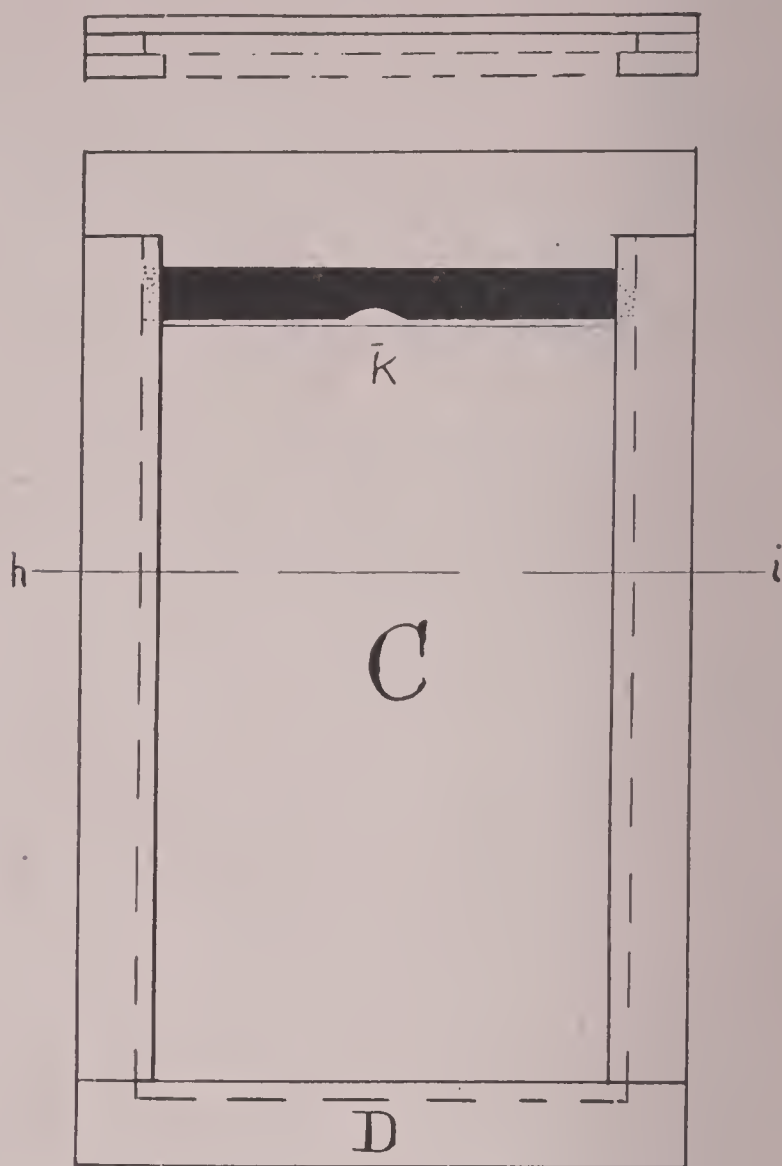


7

Next get a piece of ground glass 8x9 inches, which is half an inch larger each way than the largest pictures this size box will make. Cut a pulp board frame for this glass wide enough to fit the inner space of rear section of your enlarging box, and long enough to project two inches above the top of the box. Then cut two more frames, having the same dimensions on the outside, but the inner openings $6\frac{1}{2} \times 8\frac{1}{2}$ inches—the exact size of your largest pictures. Paste one of these frames on each side of the first one holding the ground glass, and an important part is done. (See plan and sectional view of this in Fig. 7.) The thickness of this will be three-eighths of an inch, as it is three pulp board thicknesses. The paper holders must be the same thickness, and it is well to have several, for obvious reasons. To make them, cut a piece of pulp



board $10\frac{1}{2}$ inches in length, and as wide as the outside width of the ground glass frame, then cut a piece of cardboard the exact size of your pictures— $6\frac{1}{2} \times 8\frac{1}{2}$ inches—place it one inch from the bottom of your board, leaving equal margin on each side. Mark around all sides of it, and then cut strips to bind this pencil line you have made at sides and bottom. Extend side strips $1\frac{1}{2}$ inches above upper pencil line, and fit them well at bottom crosspiece. (All inner edges should be sandpapered smooth before pasting in.) Next cut three more strips, wide enough to overlap the first ones one-eighth of an inch and paste them over the first ones so they overlap, inwardly, one-eighth of an inch at sides



and bottom. Two black carbon paper strips are pasted across near the top, the under one one-eighth and the upper one one-sixteenth inch from the pencil line bounding the top edge where the paper will come. A nick in middle of lower strip allows the paper to be taken out easily. These strips hold the paper in place when slide is drawn up. (Figures 8 show perspective view of slide, partly open, "A," front view with slide off, and top "C" and "G" shows view of back of slide.)

Now cut a slide to fit the grooves of the paper holder "B," making it long enough to extend two inches above its top. Sandpaper and bevel its edges so it will run smoothly in the grooves. This slide fits the first strips pasted on; now make another piece to fit the upper strips, and paste it on the slide so it will come about one inch from the bottom and half more from the top. Put a strong string or cord in the top to draw it up by. Mark a point, "k," shown in plan "C," one-quarter inch below the cross line, and put in slide and push it down till its bottom edge comes to this mark, then turn, while holding it there, and draw a line across the back along top edge of back of holder. Draw a large "V" on this line, as shown in "G," Fig. 8. When making the exposure, the appearance of this V on the back indicates how far the slide must be drawn to cover the top of the paper one-quarter of an inch, and hold its upper edge. In using this holder, which is inserted in box after correct focus has been made on the ground glass, it is only drawn till this "V" line appears. This method serves two purposes—it holds the top of the paper in place, and blocks the passage from light which would enter if the slide were drawn entirely out. A small pulp board wedge at back of holder, when slide is drawn for exposure, holds slide in place during exposure.

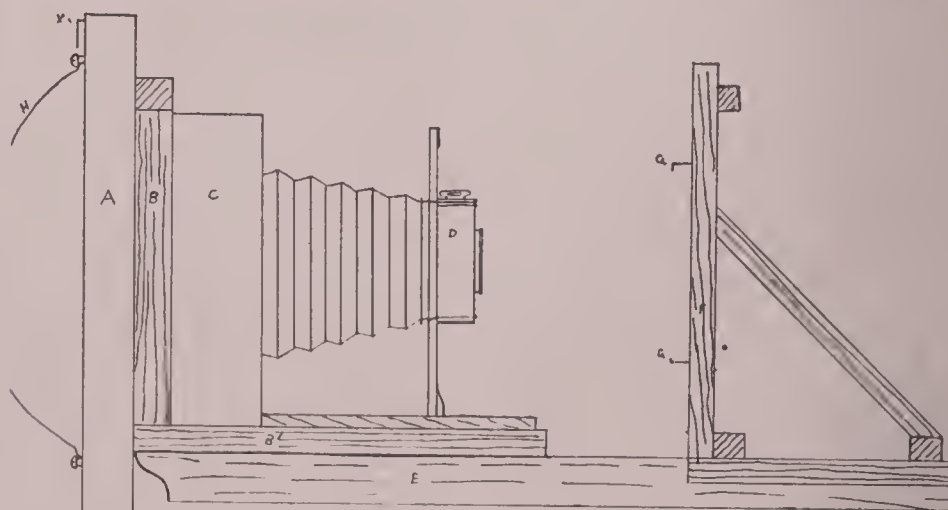
Now that the ground glass, frame, and the holder

are finished, a slit to receive them is cut at the top and back part of the box, as shown by black line in Fig. 5. A piece or strip may be taken off clear across the back, if desired, instead of copying illustration. Next fit side and bottom grooves of wood, rounding the upper near edge of the lower groove. Fig. 1, "C," shows section of these grooves, when slide is not quite as wide as width of box. The bottom and side edges of both ground glass frame and paper holder should be well rounded by using sandpaper. If well done, the three layers will appear as one solid piece. The small camera stand is securely attached to front board of box with hooks and screw eyes, shown in Fig. 1. If any light comes through around tube in front board, tie a soft black cloth around mail tube on the outside of box.

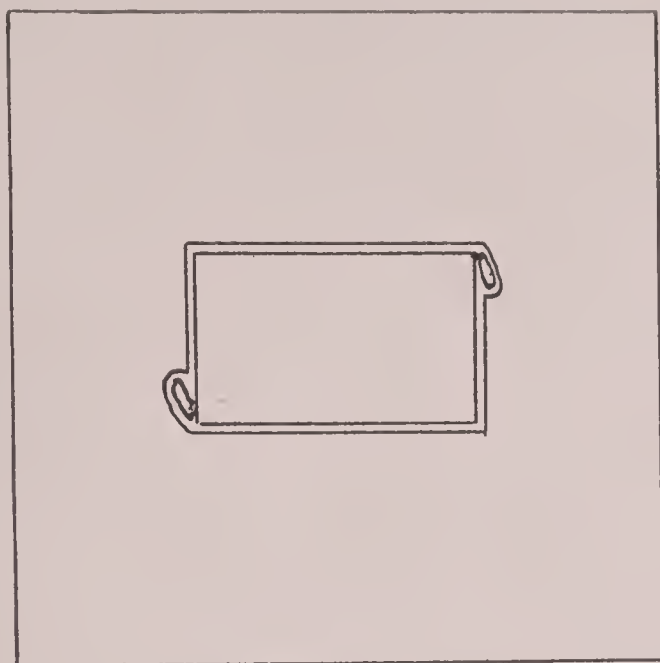
Slow papers as well as fast ones may be used in this box with perfect success. If your camera bellows is too short, slip a "portrait" cap lens on the lens hood of your camera. This will shorten the focus so images will appear sharply on the ground glass.

The camera, its stand and the paper holders may all be packed inside the enlarging box when not in use.

ENLARGING OUTFIT FOR V. P. NEGATIVES*



*From May, 1928, *Camera Craft*.



There will be no need to indulge in text, mainly abstractions and amplifications of the plain directions, so let us briefly and immediately get to the specifications and diagrams.

A is an iron box 1x10x10 inches with a 6-inch hole cut in the center of one side. And ten $\frac{3}{4}$ -inch holes cut in the same side for ventilation. Cover the upper five inches with a hood, riveted to the back as in X. Cut a hole in the center of the other side a little smaller than your flashed opal glass. Fasten six small rivets as at Y in No. 2 to hold the glass loosely.

B is a frame just large enough to take the camera, made of $\frac{3}{4}$ x $\frac{3}{4}$ -inch stuff, except B, which is a board $\frac{3}{4}$ x8x10 inches; fasten this to A so opal glass comes in center of the frame.

C is a 4x5-inch camera, without a back or a lens.

D is a V. P. special, with the small circular back removed and fastened to the lens board of C with two rubber bands.

E is a table leaf.

F is the easel, made of nine pieces of $\frac{3}{4}$ x $\frac{3}{4}$ -inch made so as to fit snugly on E, the two uprights being

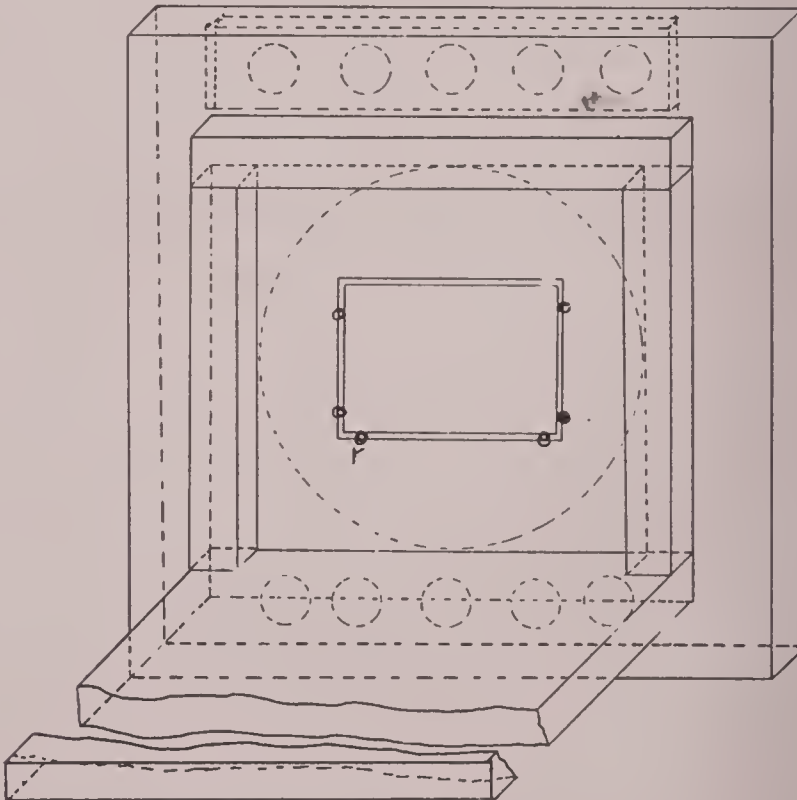
five and one-half inches apart or just enough to hold a $3\frac{1}{4} \times 5\frac{1}{2}$ -inch printing frame. On the face of these two uprights are holes (to take the bent nails G) to hold different sized printing frames.

H is a Hubbel desk lamp reflector, fitted with a 100 W stereopticon nitro lamp; it is fastened to the back of A with three stove bolts.

I, No. 3, is the kit, to hold the negative made of two pieces of cigar box to fit the back of C (a $1\frac{1}{4} \times 2\frac{3}{8}$ -inch hole in one, $1\frac{3}{4} \times 2\frac{3}{4}$ -inch in the other) glued together, two pieces of thin glass $1\frac{3}{4} \times 2\frac{3}{4}$ inches and two brass clips to hold them.

I insert this kit by sliding C out of B, put in the kit and slip it back into place.

This outfit will print a three-time enlargement on Arturo Carbon Black from an average negative in from two to three minutes.



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Leica Universal Enlarging Apparatus No. 35475

See Page Number 15

THIS apparatus is adjustable so that enlargements can be made of any desired size up to 11 x 14" and even larger. The lamp housing holds an opal glass bulb 60 watt and in conjunction with the special condenser, perfect diffusion of film grain is obtained.

The negative film is held between two optically plane glass plates and either part or the entire negative can easily be placed centrally for enlarging.

The highly corrected objective of 50mm. focal length having a relative opening of F: 3.5 insures clear definition to the very edge of the field and its speed reduces the time of exposure to approximately 10 seconds or less for average negatives. A supplementary base board with hinged glass plate is provided to hold enlarging papers up to 8 x 10" perfectly flat; for larger size papers, this board can quickly be removed and the former are placed directly upon the base plate of the apparatus. For extreme enlargements, the lamp housing can be turned around its vertical pillar and the lens can be focused upon large sheets placed below and at a greater distance than the base plate of the apparatus.

This outfit can also be furnished with a lens of 70mm. focal length F: 3.5 and equipped with iris diaphragm, this arrangement increases the depth of focus considerably and satisfactory enlargements can be made from negatives which are greatly under exposed.

The above enlarger can also be used for reproduction work by means of an additional sliding arm to which the Leica camera can be attached. Three supplementary lenses are available to cover objects of various sizes and with the printed tables furnished with these lenses, the apparatus can quickly be set so that the entire negative will be filled with the image of the object to be photographed.

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Leica Small Enlarging Apparatus No. 35455

See Page Number 14

A MOST convenient outfit to prepare "Post-card" size prints from Leica negatives.

It consists of a strong wooden box with special 64mm. objective well corrected and in fixed position. The front board is provided with the opening for the negative which is placed under an optically plane glass plate thereby holding the film entirely flat so that every part of the picture is in complete focus.

The opening of the metal frame holding the film under the glass plate serves also as a mask so that enlargements with well defined border lines will be obtained.

The back of the wooden housing is provided with a hinged door and the receptacle or space for enlarging paper cut to postcard size; with the door closed, the paper is held perfectly flat.

This enlarger can be used for daylight or with a convenient attachment for artificial light. The lamp attachment includes a 100 watt bulb of opal glass which forms a uniform source of light and eliminates the grain of the film entirely. For average negatives, the time of exposure required is about 10 seconds.

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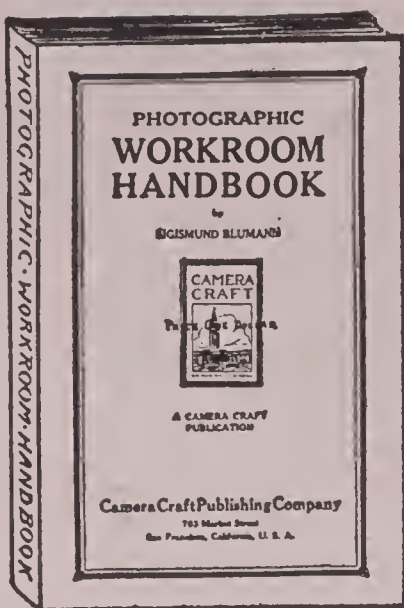
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